S
388.4
H3b
1965

BUTTE

STATE DOCUMENTS

NOV 26 1974

TRAFFIC ENGINEERING STUDY

1965

MONTANA STATE LIBRARY
930 East Lyndale Avenue
Helena, Montana 59601

MONTANA HIGHWAY COMMISSION

COMMISSION

ALEX BLEWETT CHAIRMAN
GREAT FALLS

S. N. HALVORSON VICE CHAIRMAN
KALISPELL

JOSEPH M. NASS MEMBER
POPLAR

ARNOLD M. SWANSON, MEMBER
BOZEMAN

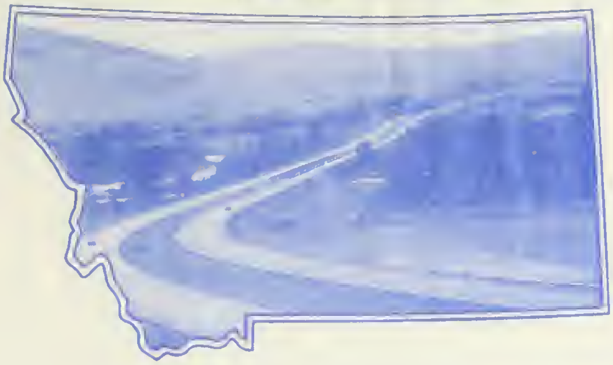
DALLAS W. VAN DELINDER MEMBER
BILLINGS

JOHN D. WHEELER, SECRETARY
HELENA

TIM BABCOCK
GOVERNOR

PAUL M. JOHNSON
STATE HIGHWAY ENGINEER

HELENA, MONTANA



IN REPLY REFER TO
26-PRD

May 25, 1966

Mr. George Schotte
Butte Chamber of Commerce
100 East Broadway
Butte, Montana

Dear George:

Enclosed is one advance copy of the Butte Traffic Engineering Study.

As this report must still be approved by the Bureau of Public Roads, it will be appreciated if it is not released to the general public until such approval is obtained.

If you believe that a formal presentation of our recommendations will be of any value, a meeting can probably be arranged after Bureau approval is obtained.

We hope that this report will help in solving some of Butte's more pressing traffic problems.

Very truly yours,

PAUL M. JOHNSON
State Highway Engineer

By______________________________
Paul R. DeVine
Planning Survey Manager

PRD/mu
Enc.
cc: Paul M. Johnson

Digitized by the Internet Archive
in 2013

http://archive.org/details/buttetrafficengi00mont

BUTTE, TRAFFIC ENGINEERING STUDY

CONDUCTED BY

MONTANA STATE HIGHWAY COMMISSION
TRAFFIC ENGINEERING SECTION
AND
PLANNING SURVEY SECTION
IN COOPERATION WITH
U S DEPARTMENT OF COMMERCE
BUREAU OF PUBLIC ROADS
THE CITY OF BUTTE
AND
SILVER BOW COUNTY

Montana State Library
3 0864 1006 4253 0

MAY 1966

TABLE OF CONTENTS

PAGE

List of Exhibits - iii

Introduction - 2

Traffic Volumes - 6

Speed and Delay Studies - 16

Traffic Engineering Studies - - - - - - - - - - - - - - - - - - - 38

  Park Street and Broadway - - - - - - - - - - - - - - - - - - - 38

  Harrison Avenue - 40

  Arizona and Utah Avenue - - - - - - - - - - - - - - - - - - - 42

  Montana Street - 45

  Rowe Road and Holmes Avenue - - - - - - - - - - - - - - - - - 47

  Elizabeth Warren Drive and Lofter Lane - - - - - - - - - - - - 48

  Main Street, Kaw Avenue and Lexington Street - - - - - - - - - 49

  Front Street - 49

  Cobban Street - 51

  Second Street - 52

  Grand Avenue - 53

  Continental Drive, Farrell Street and Shields Avenue - - - - 53

  Garfield, Stuart and Sheridan Avenues and Atherton Lane - - - 59

  Amherst Street - 61

  Farragut, Adams, Oregon Avenues and Dewey Boulevard - - - - - 62

  Platinum Street - 63

  Park and Ohio Streets - 64

  Mercury Street - 64

Traffic Signal Study - 68

  Future Signal Recommendations - - - - - - - - - - - - - - - - 72

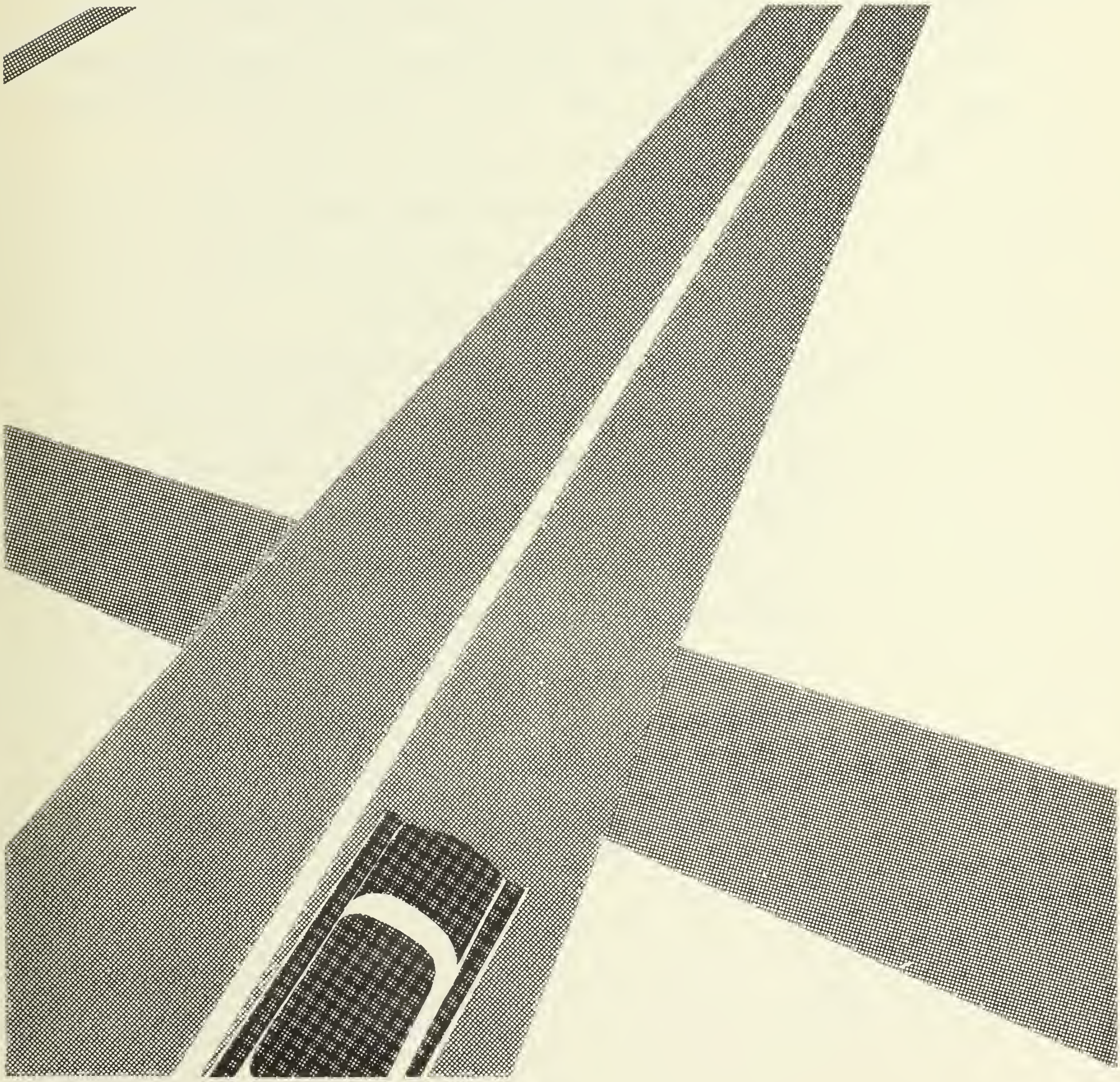
LIST OF EXHIBITS

EXHIBIT NUMBER	DESCRIPTION	PAGE NUMBER
1	Map of Major Street System	4
2	Average Daily Traffic Volumes	8
3	Average Daily Traffic Flow	9
4	Average Daily Traffic Flow--Inset	10
5	Peak Hour Turning Movements	11
6	Hourly Traffic Patterns--Average Weekday	12
7	Daily Traffic Patterns	13
8	Monthly Traffic Patterns	14
9 - 10	Speed and Delay Study--Granite Street	18 - 19
11 - 12	Speed and Delay Study--Broadway Street	20 - 21
13 - 14	Speed and Delay Study--Park Street	22 - 23
15 - 16	Speed and Delay Study--Galena Street	24 - 25
17 - 18	Speed and Delay Study--Mercury Street	26 - 27
19 - 20	Speed and Delay Study--Montana Avenue	28 - 29
21 - 22	Speed and Delay Study--Main Street	30 - 31
23 - 24	Speed and Delay Study--Wyoming Street	32 - 33
25 - 26	Speed and Delay Study--Arizona-Harrison Avenues	34 - 35
27	Recommended Arterials and Traffic Control Devices	39
28	Pavement Marking Layout--Park Street	41
29	Lane Arrangements--Harrison Avenue	43
30	Parking Lot Arrangement--Harrison Avenue	44

LIST OF EXHIBITS

EXHIBIT NUMBER	DESCRIPTION	PAGE NUMBER
31	Proposed Channelization--Utah-Arizona Avenues	46
32	Proposed Lane Arrangement on Front Street	50
33	Proposed Channelization--Harrison and Grand Avenues	54
34	Standard School Crossing--Unpatrolled	56
35	Standard School Crossing--Patrolled	57
36	Recommended Speed Zoning--Continental Drive	58
37	Proposed Reconstruction of Intersection of Stuart Avenue and Columbia Gardens Road	60

INTRODUCTION



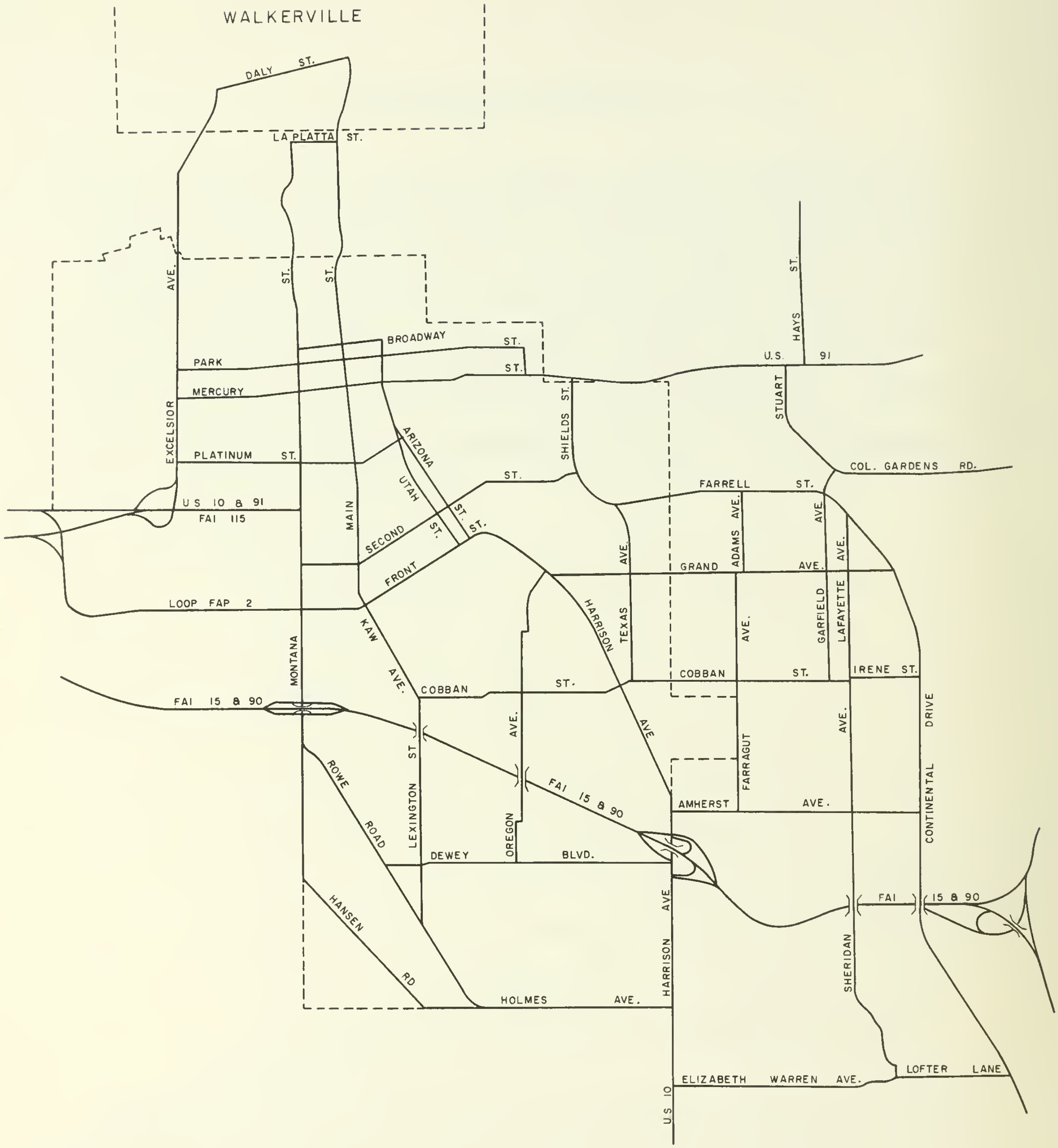
INTRODUCTION

Representatives of the City of Butte and Silver Bow County requested aid from the State Highway Commission in solving some of the more pressing traffic engineering problems in the Butte Metropolitan Area. This cooperative project was undertaken in 1965 under the direction of the Traffic Engineering Section of the Montana State Highway Department. Other cooperating agencies were the Planning Survey Section of the State Highway Department, U. S. Bureau of Public Roads, the City of Butte and Silver Bow County.

The objectives of this survey were defined as follows:

1. To upgrade the use of the present arterial street system by pinpointing and eliminating the major causes of present traffic congestion.
2. To study the arterial street system proposed by a consulting engineering firm in the Butte Master Plan of 1960, to determine whether this street system is still adequate to handle the changing traffic patterns.
3. To study the use of signs, signals and other traffic control devices on the arterial street system to determine whether they conform to recommended policies and State law.
4. To study the feasibility of returning Park and Broadway Streets to two-way operation through the downtown area.

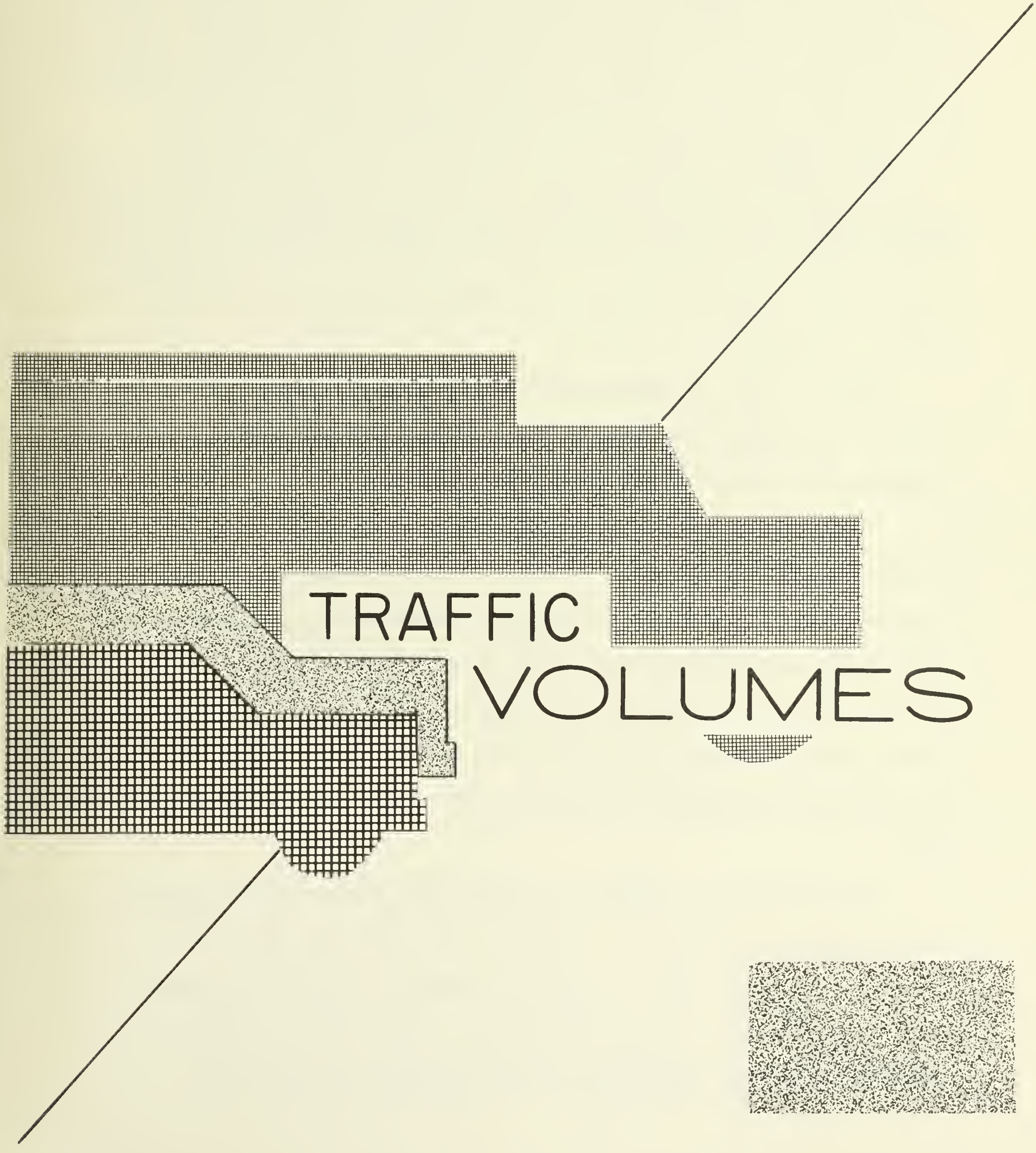
The major street system that has been proposed for study is shown in Exhibit 1 on page 4. This system, with some minor modifications, was recommended by consultants in the 1960 Master Plan Report for Butte and Silver Bow County. The major arterials shown in this exhibit have been studied to determine whether they are adequate to carry present and future traffic volumes. Improvements have been recommended to relieve specific traffic problems and to increase the level of service that the arterial system is presently providing the traveling public.



BUTTE
TRAFFIC ENGINEERING STUDY
STUDY SYSTEM

EXHIBIT I

TRAFFIC VOLUMES



TRAFFIC VOLUMES

The first step in a solution to any urban traffic problem is to determine the quantity of traffic that must be served by each street facility. After the traffic volumes on each segment of street are known it can then be determined how well these volumes are being served by present street facilities.

Approximately 110 volume counts were taken on the proposed arterial street system in Butte during April and May of 1965. These counts were taken by machine between every intersection on the arterial system, and at other major traffic breaks. The results of this traffic counting program are shown in detail in Exhibit 2 on page 8.

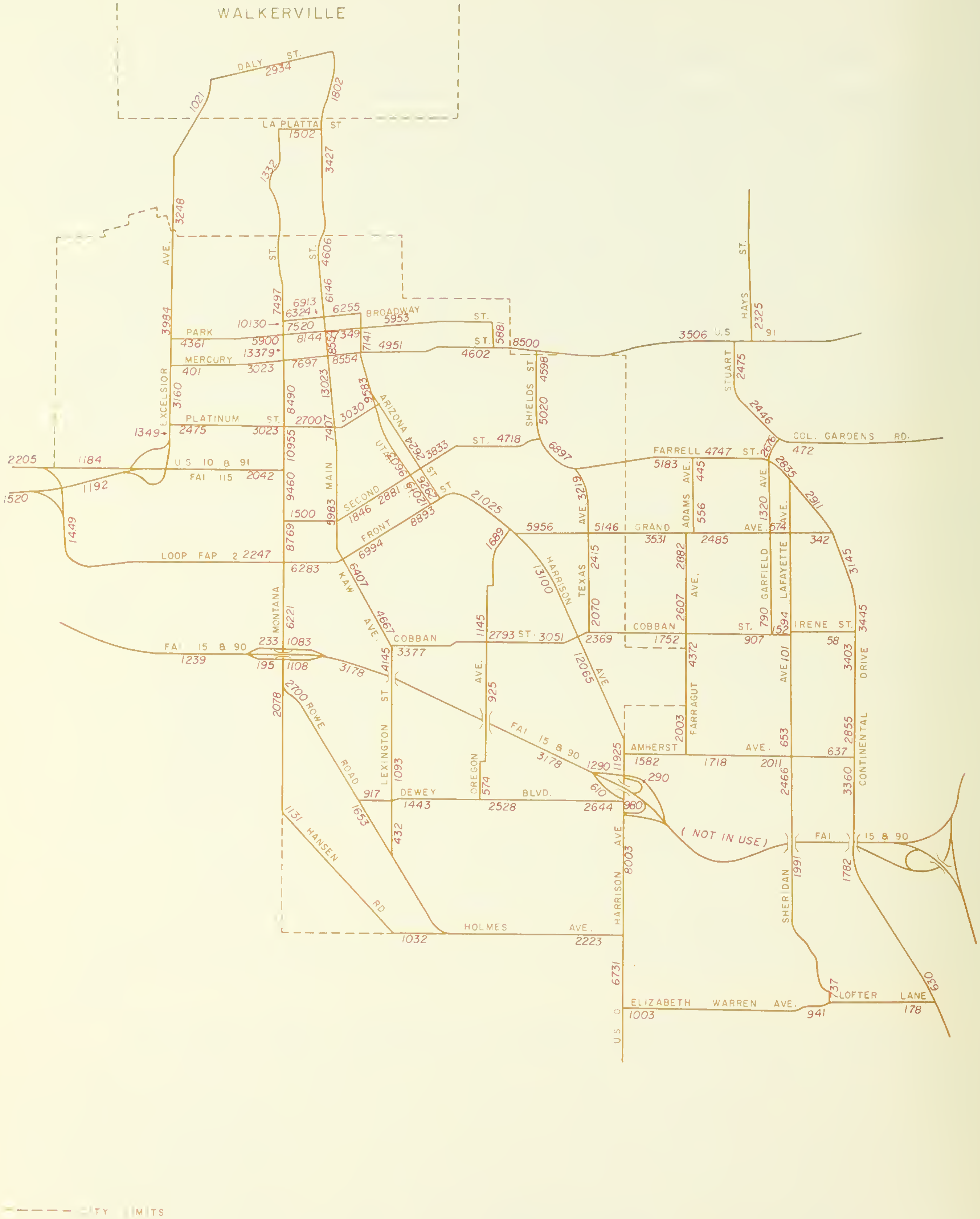
Exhibits 3 and 4 on pages 9 and 10 illustrate the traffic flow on the major streets in the Butte Urban area by means of traffic flow bands plotted to scale. Average daily traffic volumes are for the year 1965.

In addition to the machine traffic counts taken to establish average daily traffic volumes, approximately 60 manual turning movement traffic counts were taken at major intersections throughout the urban area. These intersections were counted by 15 minute intervals during the hours of 7 a.m. to 9 a.m., 10 a.m. to 2 p.m. and 4 p. m. to 6 p.m. The peak hour of travel as determined by these counts occurred between 4:30 p.m. and 5:30 p.m. as shown in Exhibit 5 on page 11. Approximately 10 percent of the total 24-hour travel occurred during this one hour.

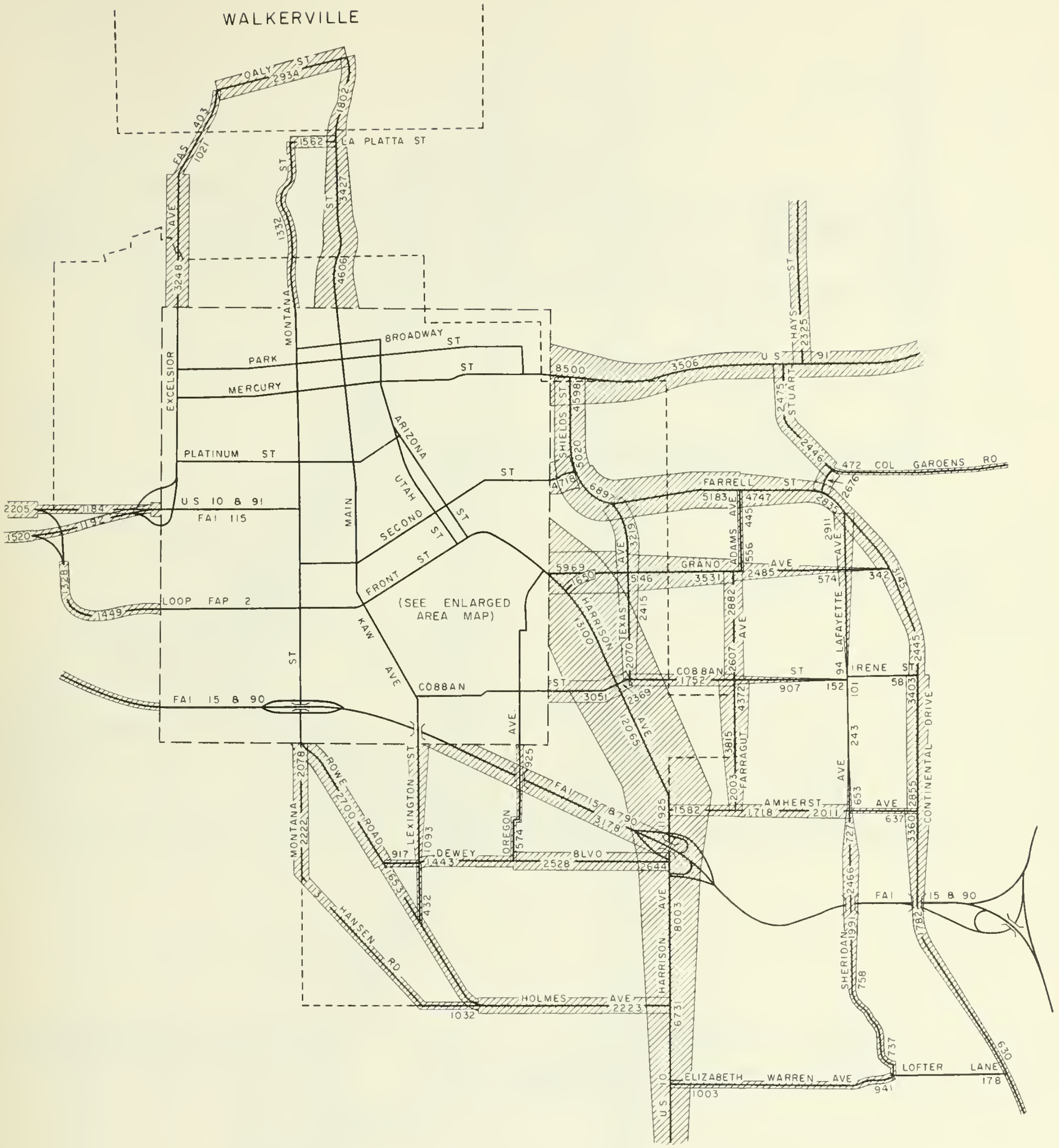
The hourly traffic pattern of an average weekday on Butte's streets is shown in Exhibit 6 on page 12. It will be noted that the lowest hourly volume occurs between 3 a.m. and 4 a.m. when less than one-half of one percent of the total 24 hour traffic is using the streets. This exhibit was compiled from a composite of machine traffic counts taken throughout the urban area.

Exhibit 7 on page 13 illustrates the daily variation of traffic volumes on Butte's major street network in April of 1965. As shown in this exhibit , Sunday traffic volumes are about 14 percent below average for the week and traffic volumes on Friday are about 12 percent above average. Traffic volumes on Wednesday and Thursday approximate the average for a week in April.

The seasonal variation in traffic flow that can be expected in an urban area is shown in Exhibit 8 on page 14. This exhibit was compiled from a composite of continuous counts taken on major streets in urban areas throughout Montana.



BUTTE
TRAFFIC ENGINEERING STUDY
AVERAGE DAILY TRAFFIC
1965



- - - - - - CITY LIMITS

— — — ENLARGED AREA BOUNDARY

10,000

7,000

▨ SCALE FOR TRAFFIC BAND

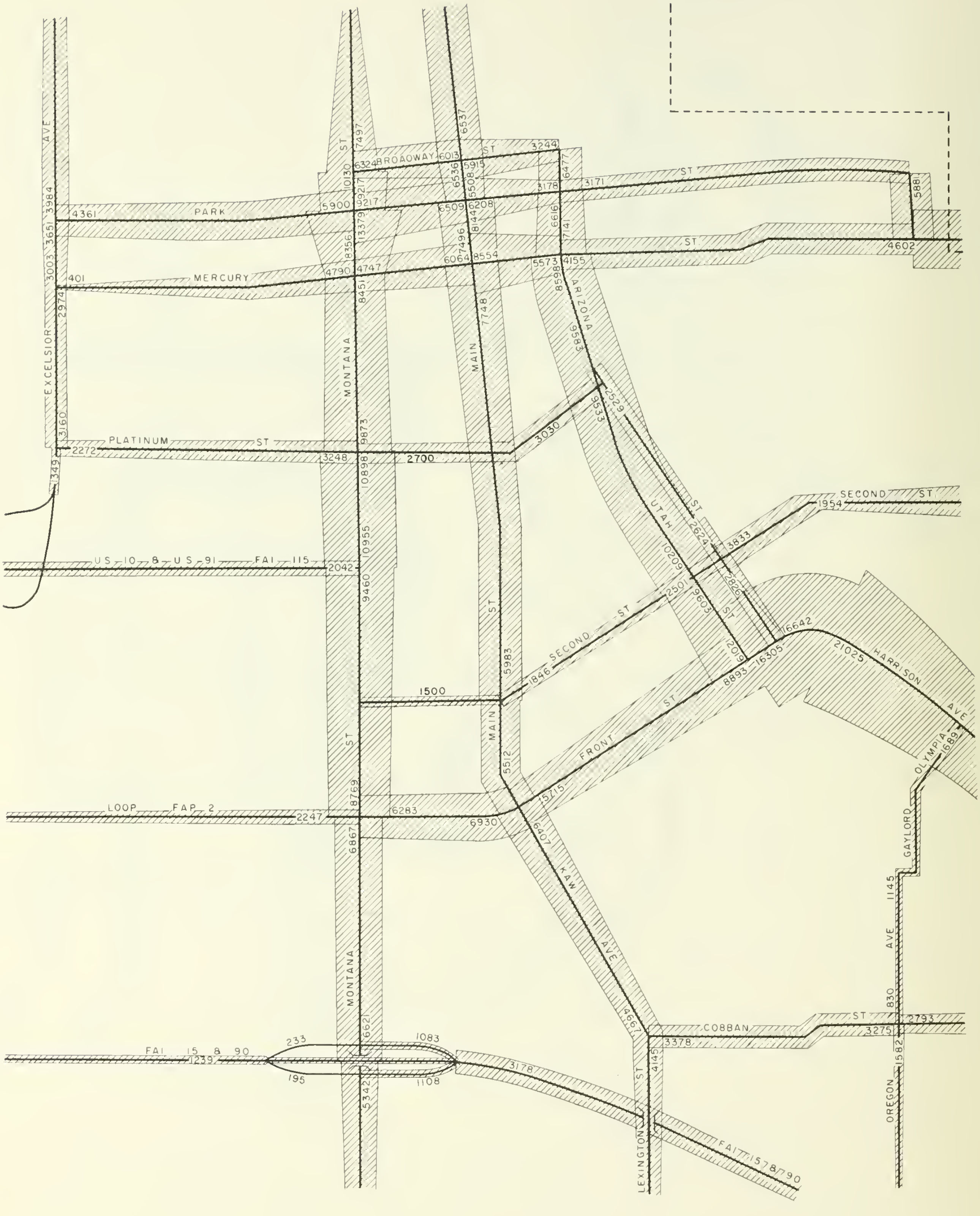
BUTTE
TRAFFIC STUDY

AVERAGE DAILY TRAFFIC FLOW

MAJOR STREET NETWORK

1965

EXHIBIT 3



ENLARGED AREA

BUTTE

TRAFFIC STUDY

AVERAGE DAILY TRAFFIC FLOW

MAJOR STREET NETWORK

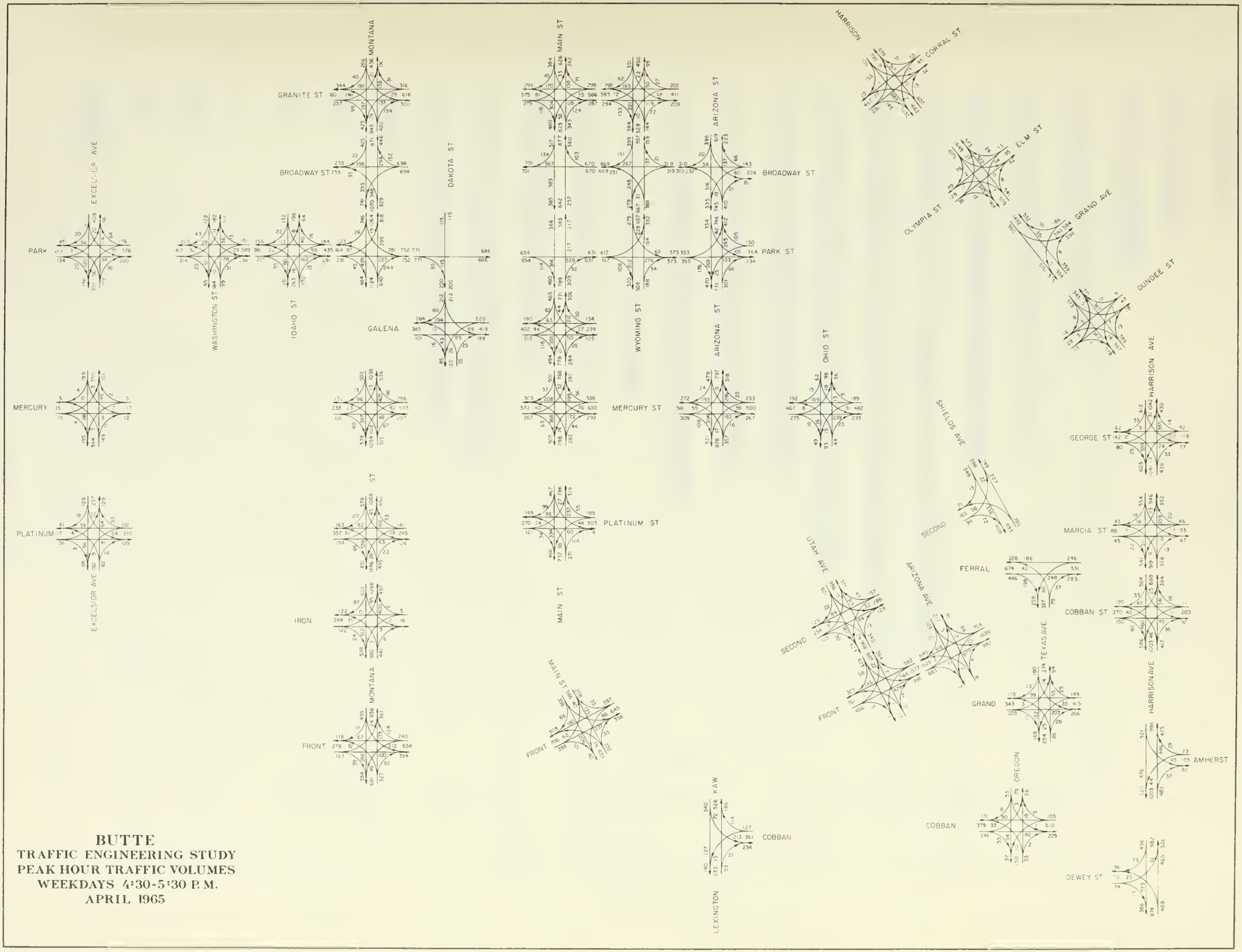
1965

- - - - - - CITY LIMITS

10,000 7,000 ▨ SCALE FOR TRAFFIC BAND

EXHIBIT 4

EXHIBIT 5



BUTTE
TRAFFIC ENGINEERING STUDY
PEAK HOUR TRAFFIC VOLUMES
WEEKDAYS 4:30-5:30 P. M.
APRIL 1965

BUTTE
TRAFFIC STUDY
HOURLY TRAFFIC PATTERNS AVERAGE WEEKDAY
1965

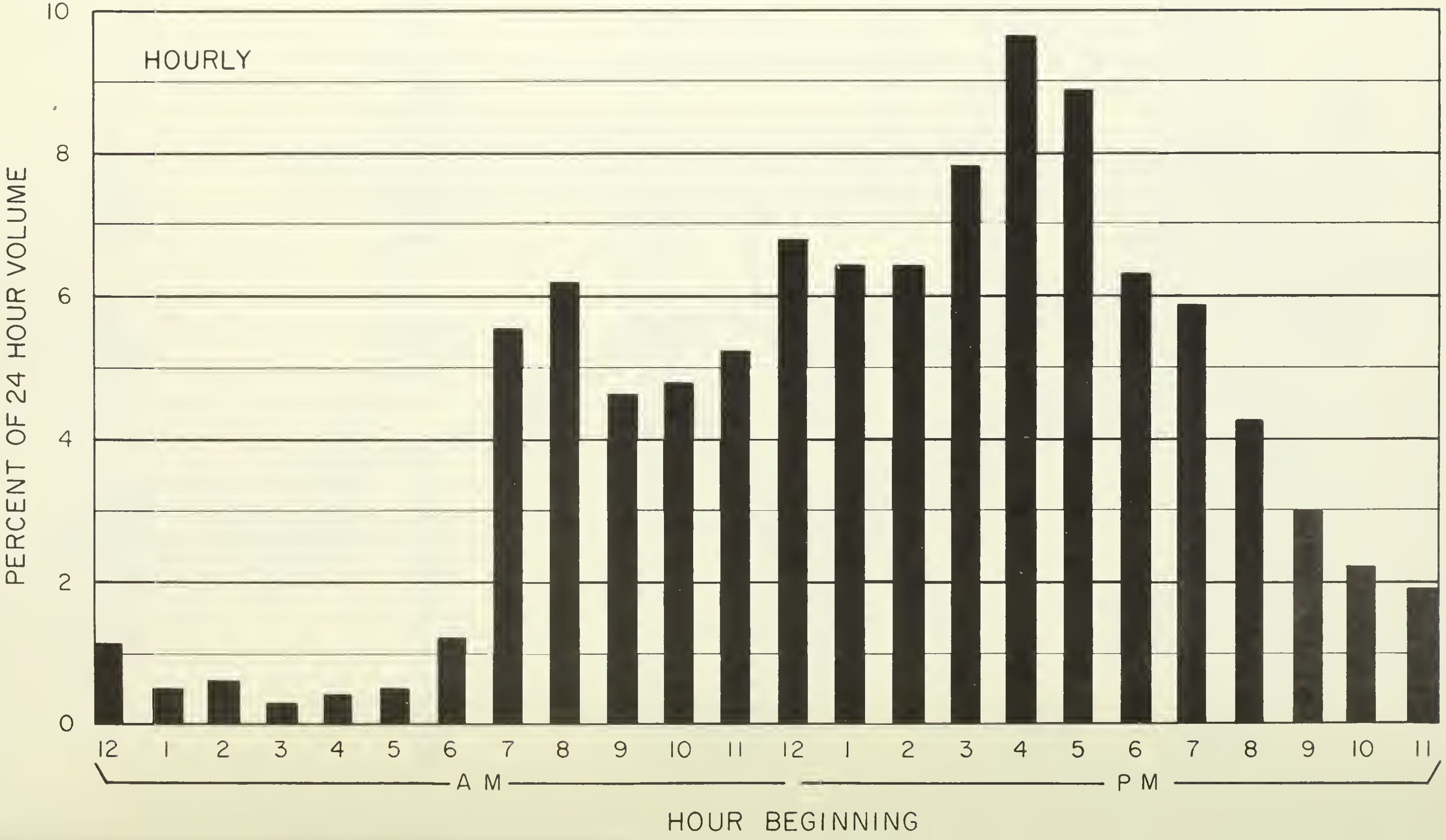


EXHIBIT 6

BUTTE TRAFFIC SURVEY
DAILY VARIATION OF TRAFFIC VOLUMES
MAJOR STREET NETWORK

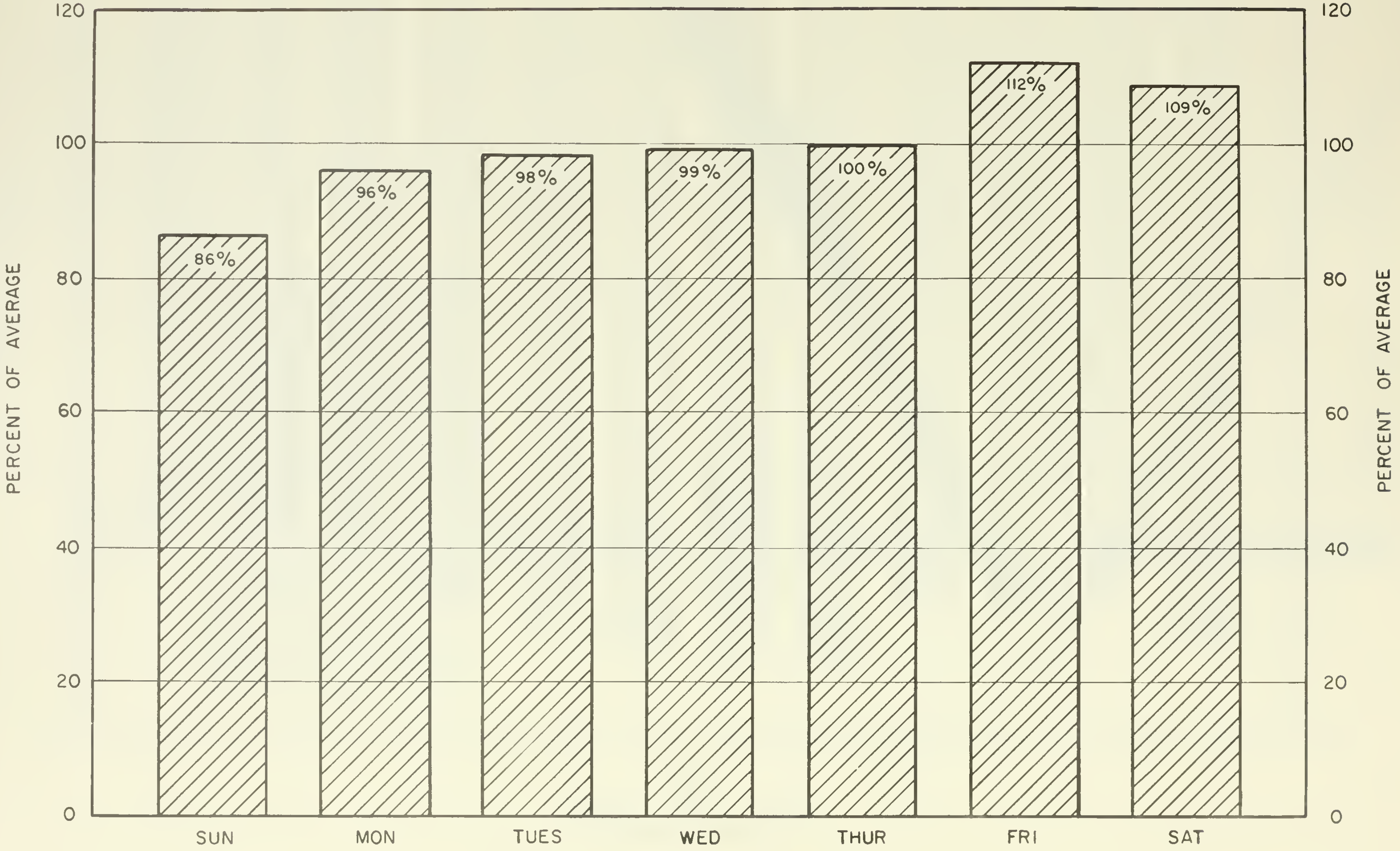


EXHIBIT 7

MONTHLY TRAFFIC PATTERNS

MAJOR STREETS
MONTANA URBAN AREAS
1965

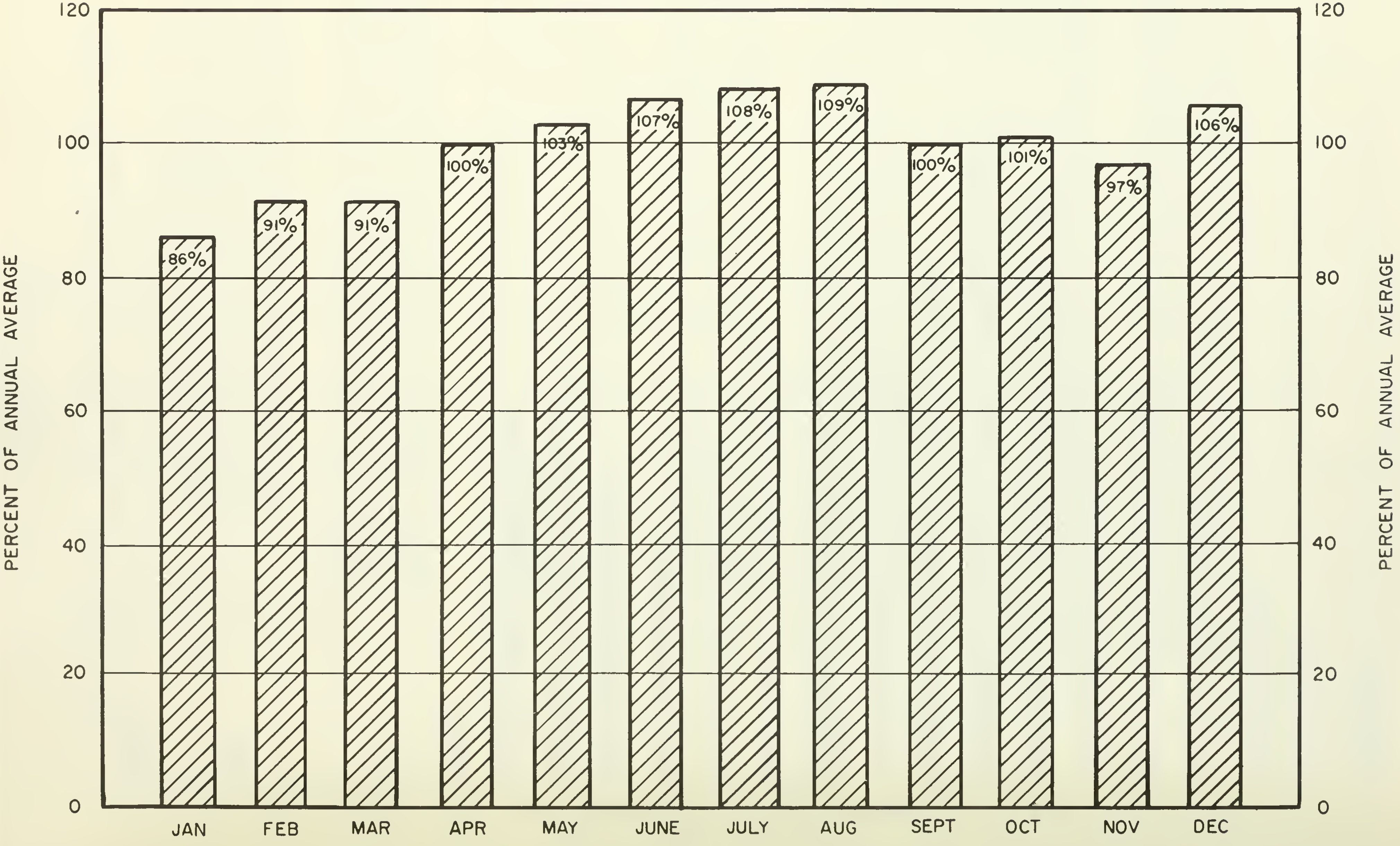


EXHIBIT 8

SPEED & DELAY STUDIES

SPEED AND DELAY STUDIES

It has been established by many studies that the automobile driver measures the desirability of a route in terms of the total travel time involved in reaching his destination. Time lost in traversing a route is a measure of congestion and may also be readily translated into costs.

A series of speed and delay studies were made on the major arterials in Butte during both the peak and off-peak hours of travel. Peak-hour studies were made between 4:30 p.m. and 5:30 p.m. in the direction of the heaviest traffic flow. Off-peak studies were made between 10 a.m. and 11 a.m. in order to obtain a comparison of overall speeds when there was less congestion.

The field observations were made by driving an automobile in the traffic stream at the average speed of all traffic. This was done primarily by the use of the driver's judgment in passing about the same number of cars that passed him. An observer with a stopwatch recorded the duration and the cause of each delay encountered along the route. Any delay that caused speed to drop below 5 miles per hour was noted and timed. This procedure was repeated during the peak-hour on the same or subsequent days until at least 6 runs had been made on each facility.

Speed and delay studies were conducted on the following streets and avenues in the Butte Metropolitan Area.

ARTERIAL	BETWEEN
Granite Street	Idaho Avenue and Arizona Avenue
Broadway Street	Thornton Avenue and Idaho Avenue
Park Street	Gerald Avenue and Thornton Avenue
Galena Street	Arizona Avenue and Montana Street
Mercury Street	Washington Street and Fir Street
Montana Street	Quartz Street and Rowe Road
Main Street	Quartz Street and Maryland Avenue

ARTERIAL	BETWEEN
Wyoming Avenue	Quartz Street and Silver Street
Arizona-Harrison Avenue	Granite and Dewey Boulevard

The results of these surveys are illustrated in graphic form in Exhibits 9 through 26 pages 18 through 35.

The results of these studies indicate extremely low speeds on major arterials within the central business district. Even the one-way couplet composed of Broadway and Park Streets was found to be operating at 10.7 MPH westbound and 9.9 MPH eastbound during the peak hour of 4:30 to 5:30 p.m. These low speeds can generally be attributed to intersection delay caused by the lack of progression and synchronization in the traffic signal system.

Some midblock delay was also caused by the prevalent practice of double parking on Park and Broadway Streets.

In order to move traffic at reasonable speeds in the Central Business District it will be necessary to implement the following general recommendations.

1. Interconnect and rephase the existing traffic signals so that progression may be maintained.
2. Eliminate parking at each intersection for a minimum of 20 feet back from the crosswalk to increase visibility and capacity.
3. Eliminate double parking by a systematic program of enforcement and education.
4. Institute a long range program for replacement and modernization of signals and other traffic control devices.
5. Institute a program to paint traffic lane lines, crosswalks, parking stalls, no parking zones, etc. at frequent time intervals to assure good visibility.

BUTTE TRAFFIC STUDY

SPEED AND DELAY

GRANITE ST. BETWEEN IDAHO AVE AND ARIZONA AVE.

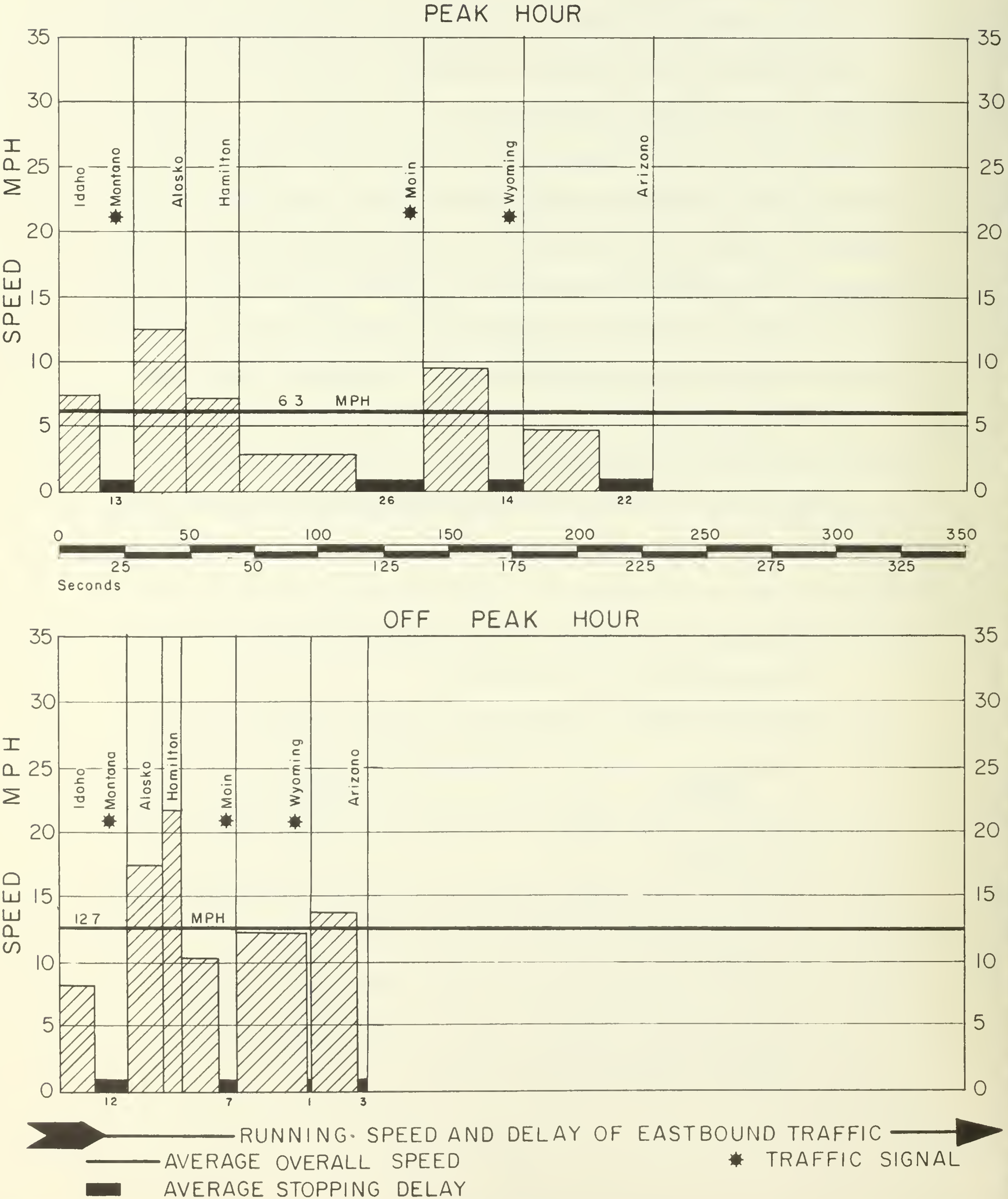


EXHIBIT 9

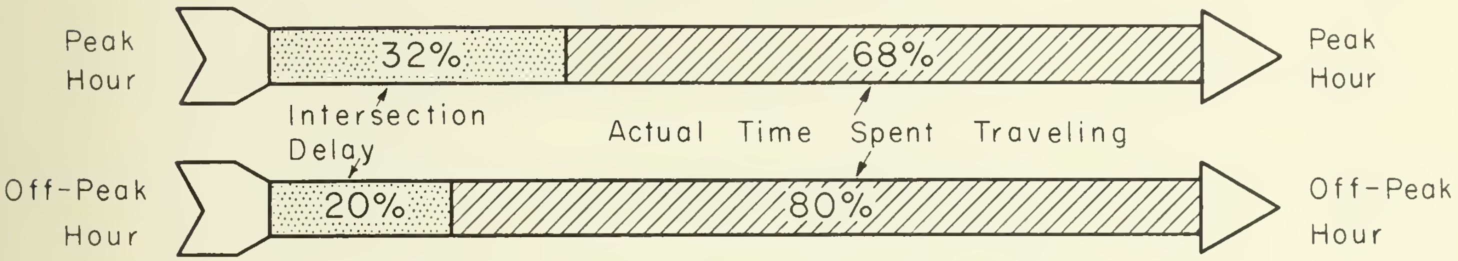
BUTTE TRAFFIC STUDY

SPEED AND DELAY

GRANITE ST. BETWEEN IDAHO AVE. AND ARIZONA AVE.

PERCENT TRAVEL TIME

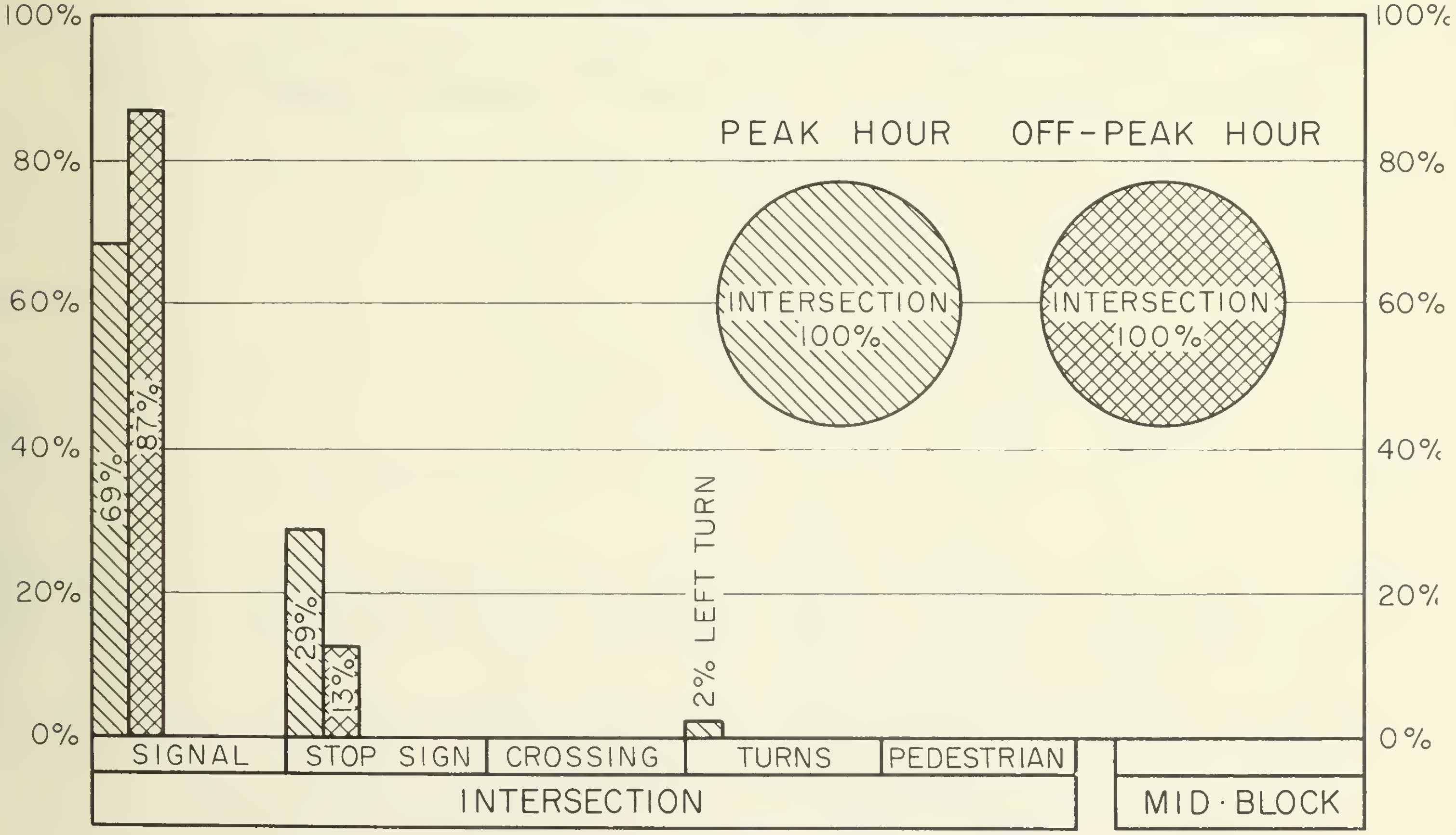
EASTBOUND TRAFFIC



LENGTH OF ROUTE = .405 MI.

	PEAK HOUR	OFF-PEAK HOUR
Average Overall Driving Time	3 Min. 50 Sec.	1 Min. 55 Sec.
Average Overall Speed	6.34 M. P. H.	12.66 M. P. H.
Average Traveling Speed	9.42 M P H	15.84 M P H

PERCENT DELAY



NOTE: OFF PEAK-HOUR OBSERVATIONS WERE MADE FROM 10:00 TO 11:00 A.M.
PEAK-HOUR OBSERVATIONS WERE MADE FROM 4:30 TO 5:30 P.M.

EXHIBIT 10

BUTTE TRAFFIC STUDY
SPEED AND DELAY
BROADWAY ST. BETWEEN THORNTON AVE. AND IDAHO AVE.

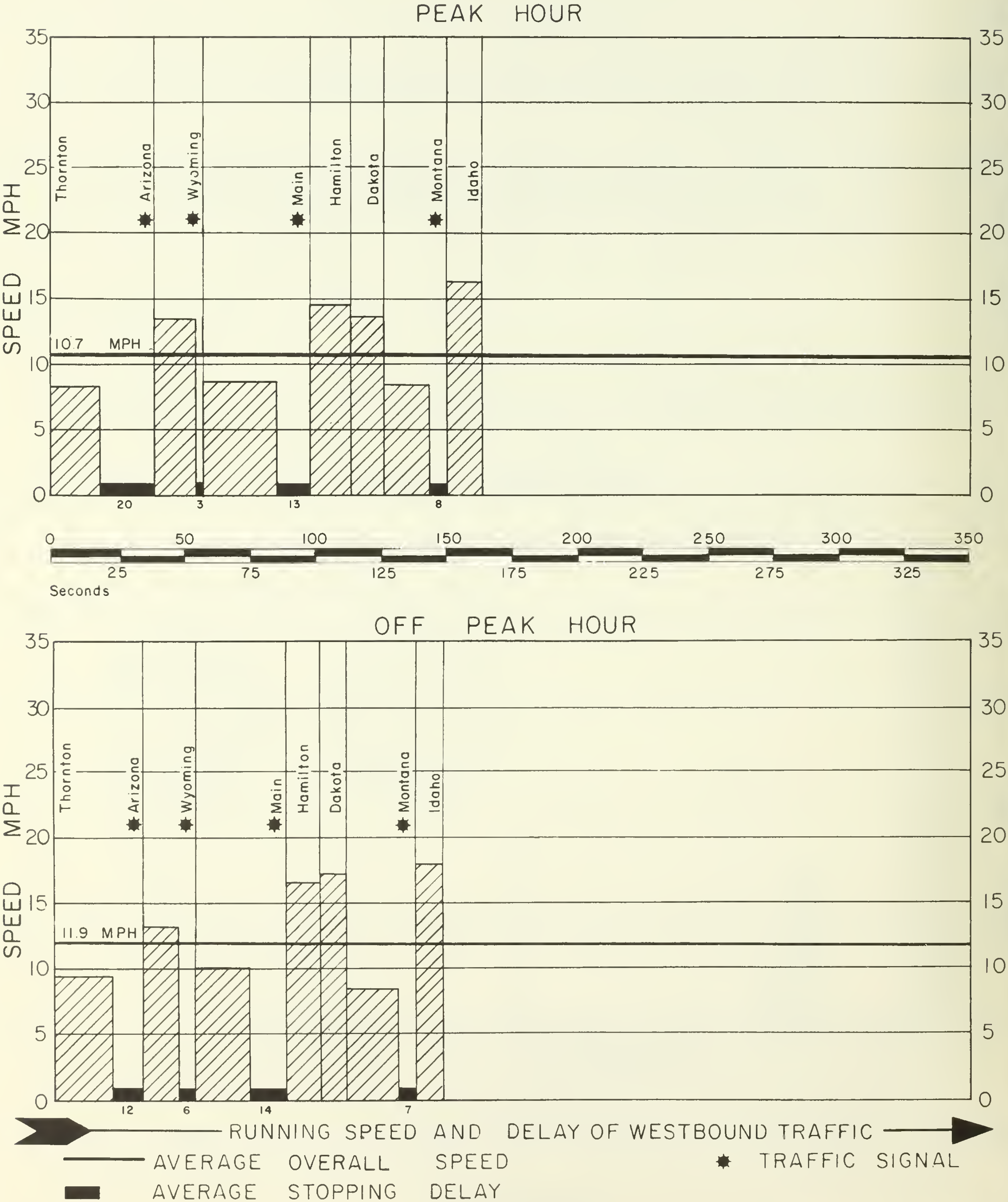
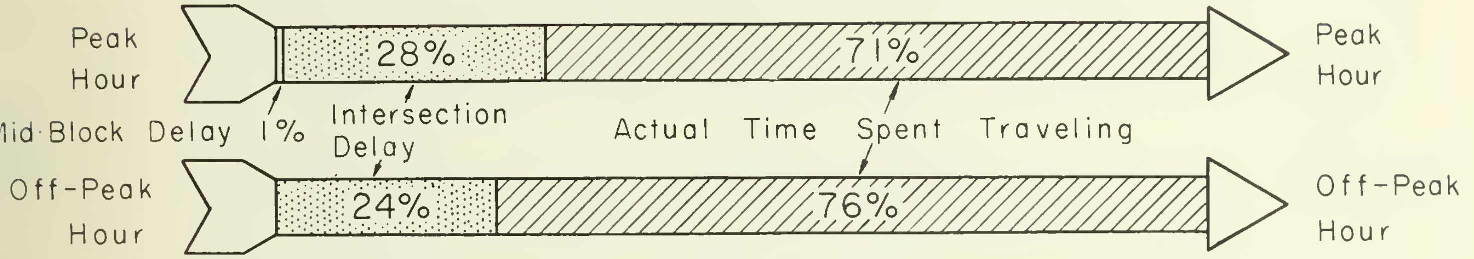


EXHIBIT 11

BUTTE TRAFFIC STUDY
SPEED AND DELAY
BROADWAY ST. BETWEEN THORNTON AVE. AND IDAHO AVE.

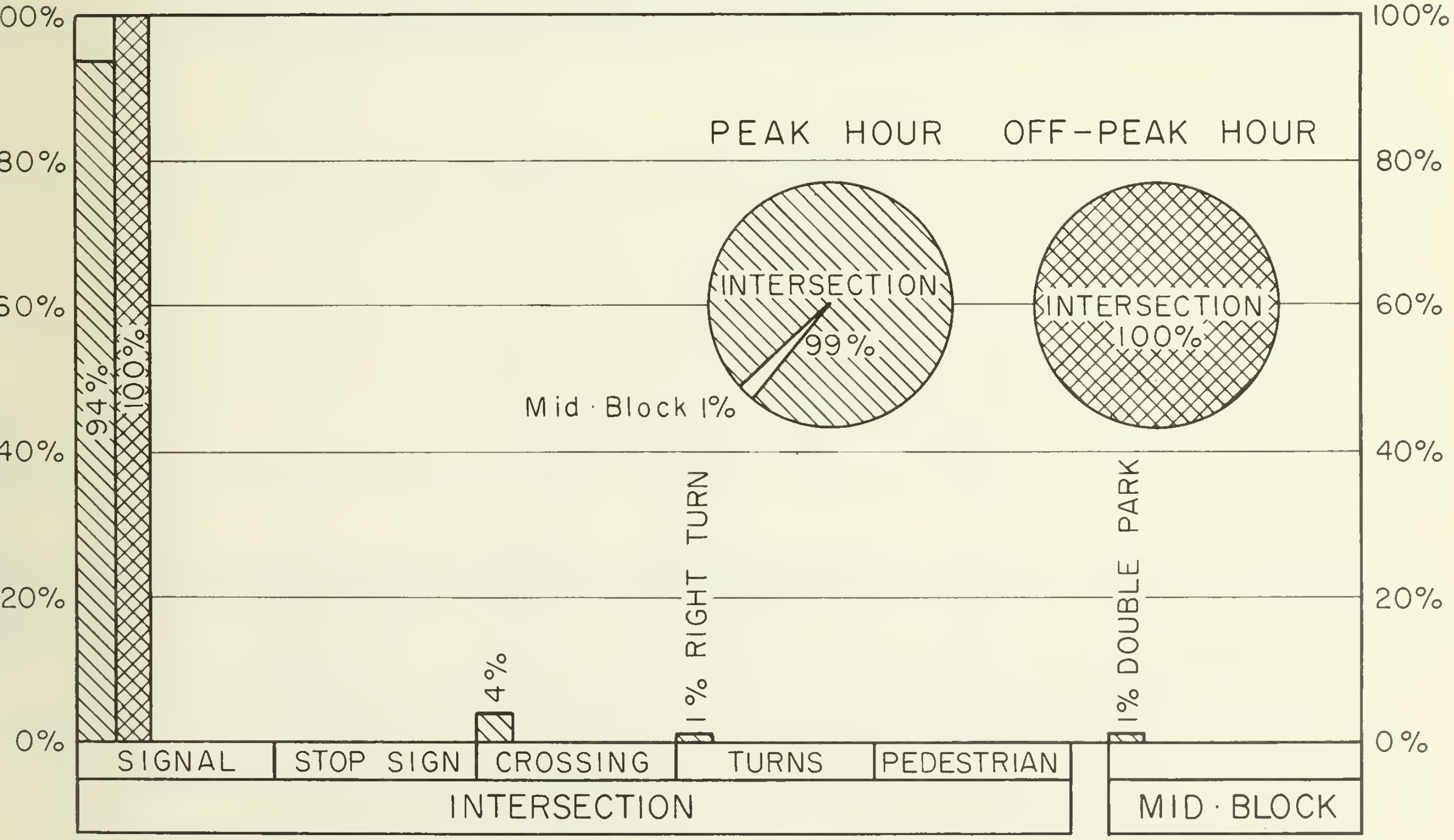
PERCENT TRAVEL TIME
WESTBOUND TRAFFIC



LENGTH OF ROUTE = .488 MI.

	PEAK HOUR	OFF-PEAK HOUR
Average Overall Driving Time	2 Min. 44 Sec.	2 Min. 0 Sec.
Average Overall Speed	10.72 M. P. H.	11.87 M. P. H.
Average Traveling Speed	14.40 M. P. H.	15.60 M. P. H.

PERCENT DELAY

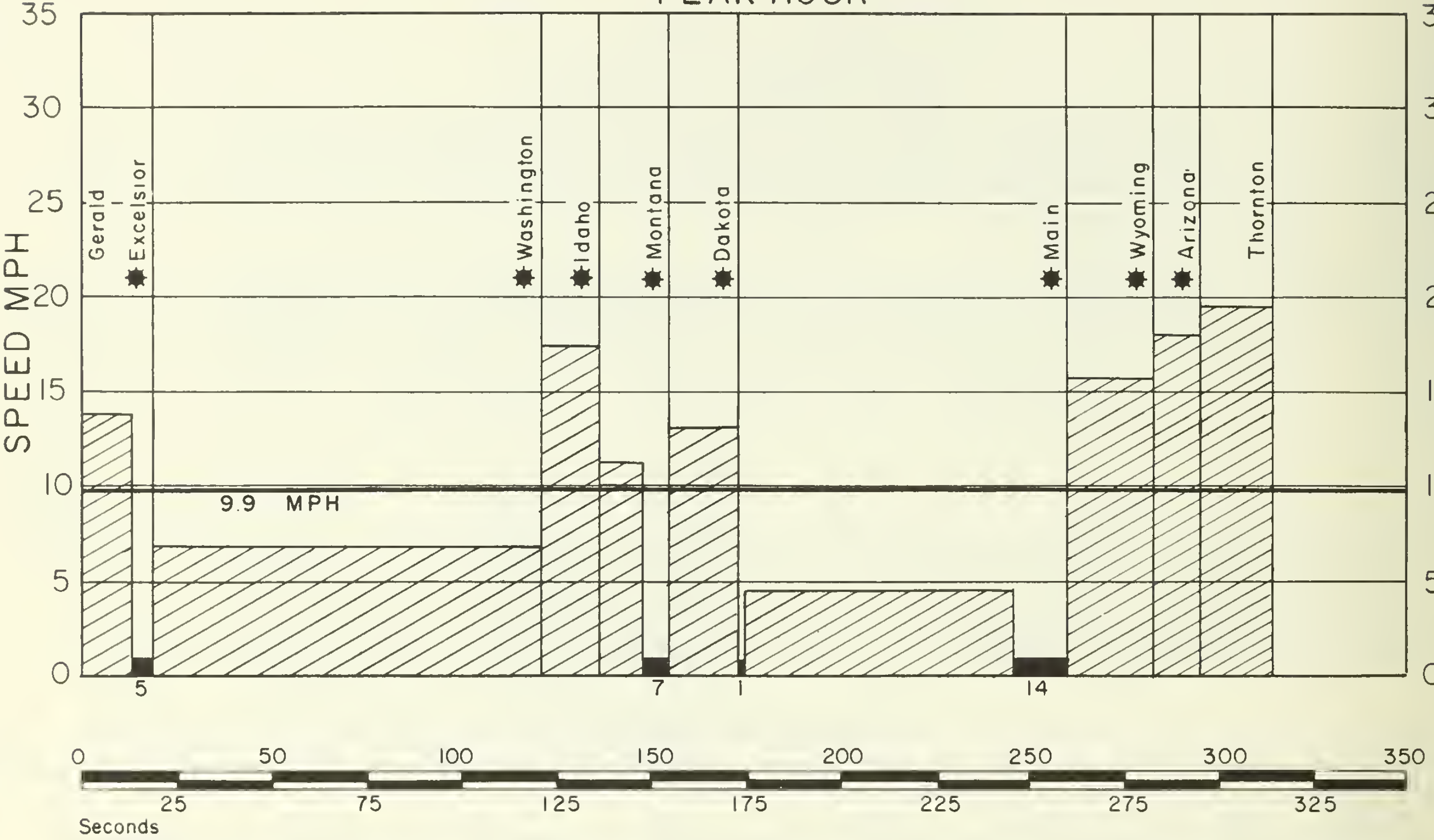


NOTE: OFF PEAK-HOUR OBSERVATIONS WERE MADE FROM 10:00 TO 11:00 A.M.
PEAK-HOUR OBSERVATIONS WERE MADE FROM 4:30 TO 5:30 P.M.

EXHIBIT 12

BUTTE TRAFFIC STUDY
SPEED AND DELAY
PARK ST. BETWEEN GERALD AVE. AND THORNTON AVE.

PEAK HOUR



OFF PEAK HOUR

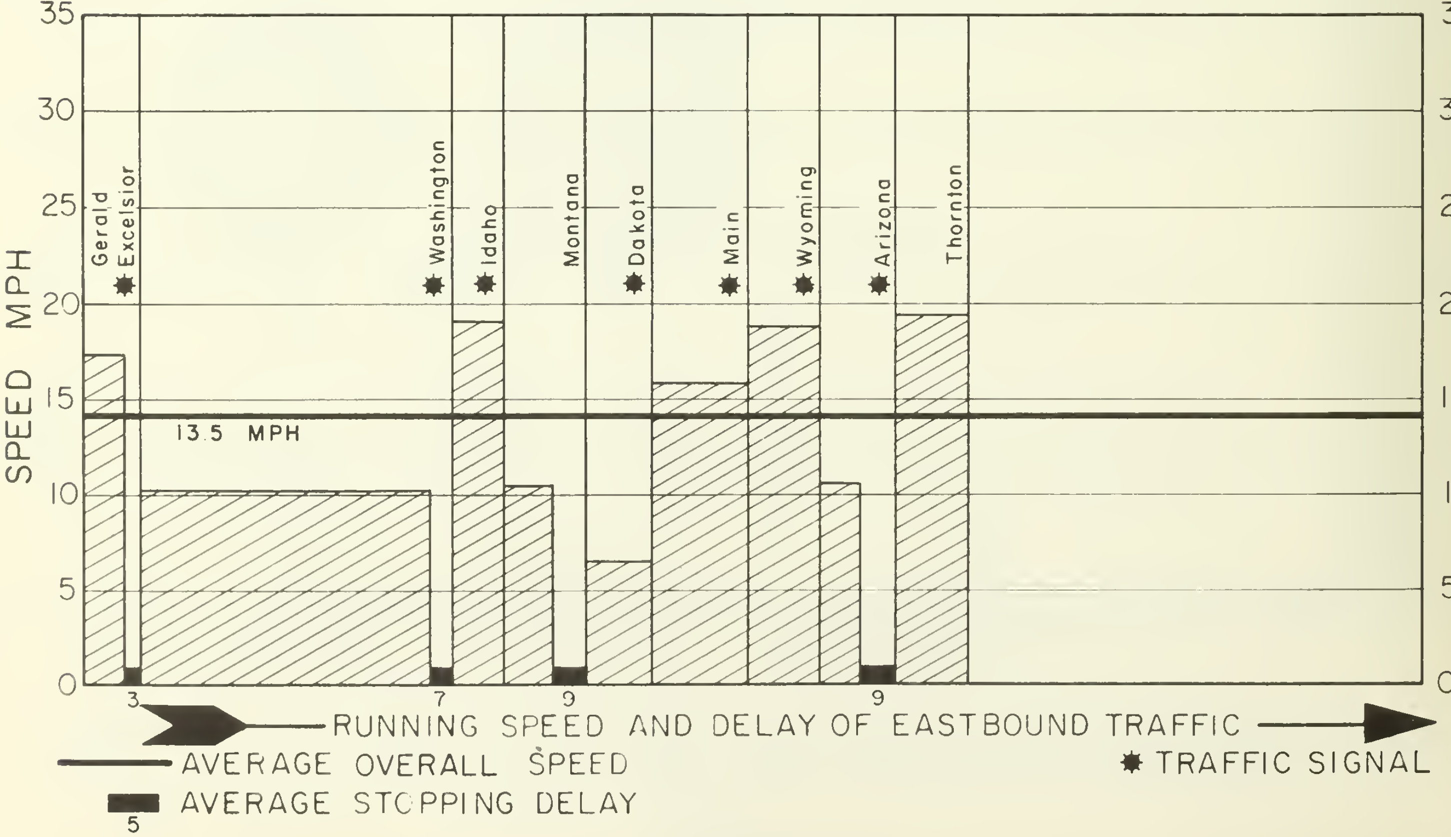
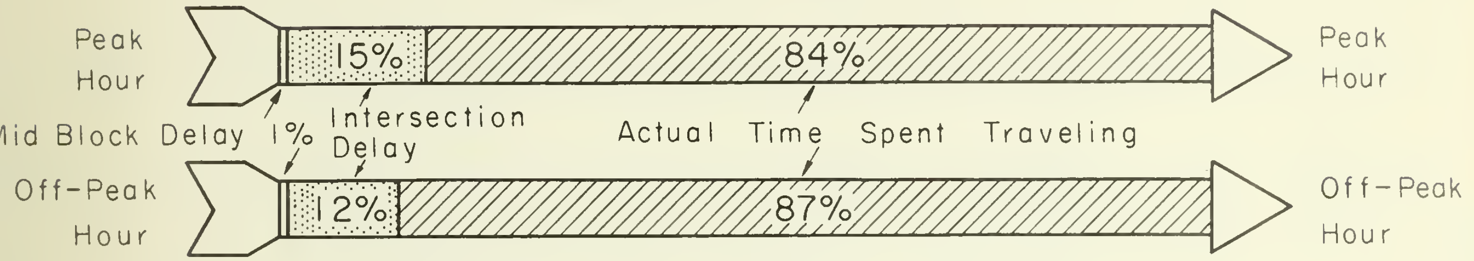


EXHIBIT 13

BUTTE TRAFFIC STUDY
SPEED AND DELAY
PARK ST. BETWEEN GERALD AVE. AND THORNTON AVE.

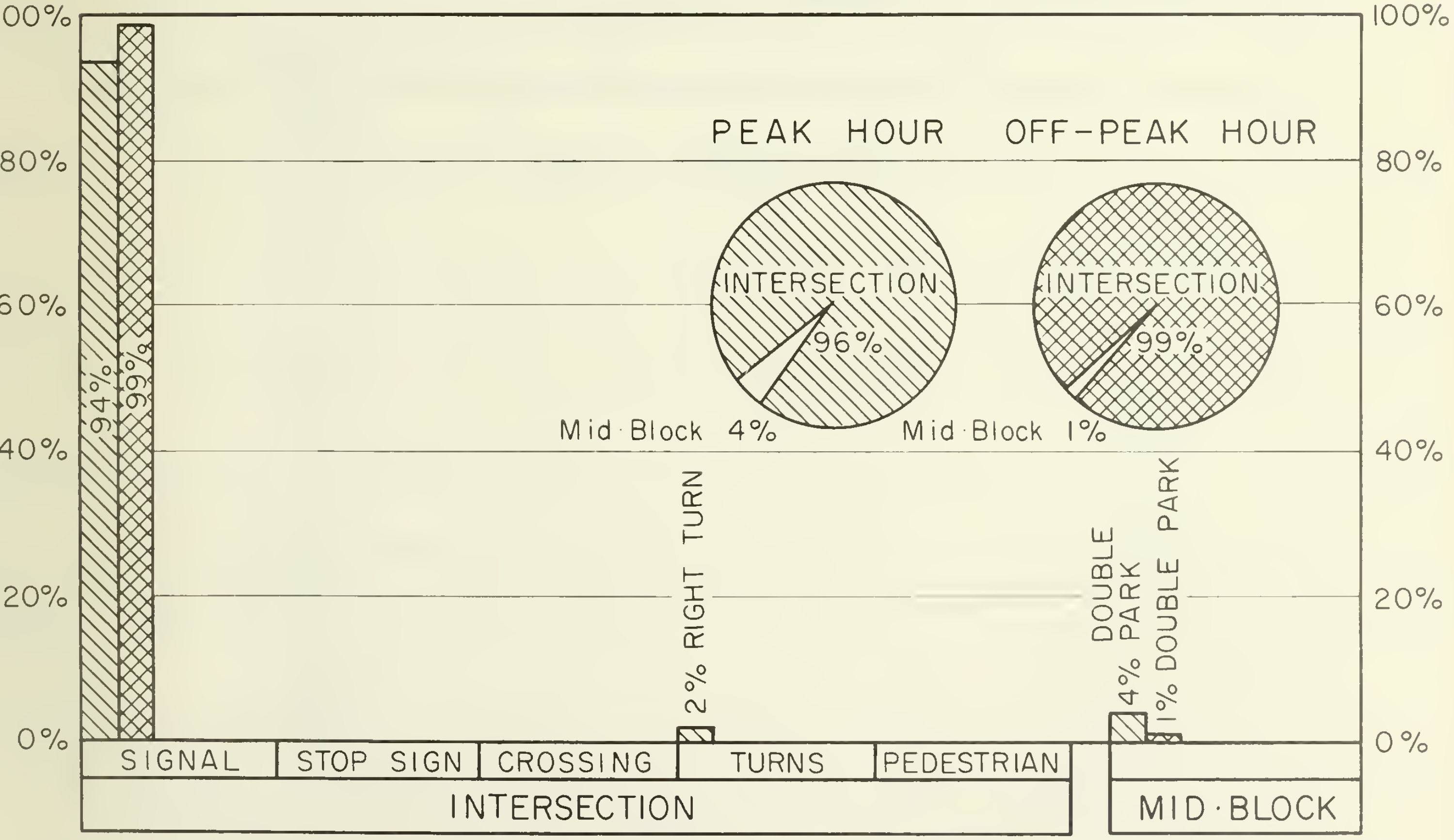
PERCENT TRAVEL TIME
EASTBOUND TRAFFIC



LENGTH OF ROUTE = .867 MI.

	PEAK HOUR	OFF-PEAK HOUR
Average Overall Driving Time	5 Min. 14 Sec.	3 Min. 51 Sec.
Average Overall Speed	9.94 M. P. H.	13.50 M. P. H.
Average Traveling Speed	11.82 M. P. H.	15.42 M. P. H.

PERCENT DELAY



NOTE: OFF PEAK-HOUR OBSERVATIONS WERE MADE FROM 10:00 TO 11:00 A.M.
PEAK-HOUR OBSERVATIONS WERE MADE FROM 4:30 TO 5:30 P. M

EXHIBIT 14

BUTTE TRAFFIC STUDY
SPEED AND DELAY
GALENA ST. BETWEEN ARIZONA AVE. AND MONTANA ST.

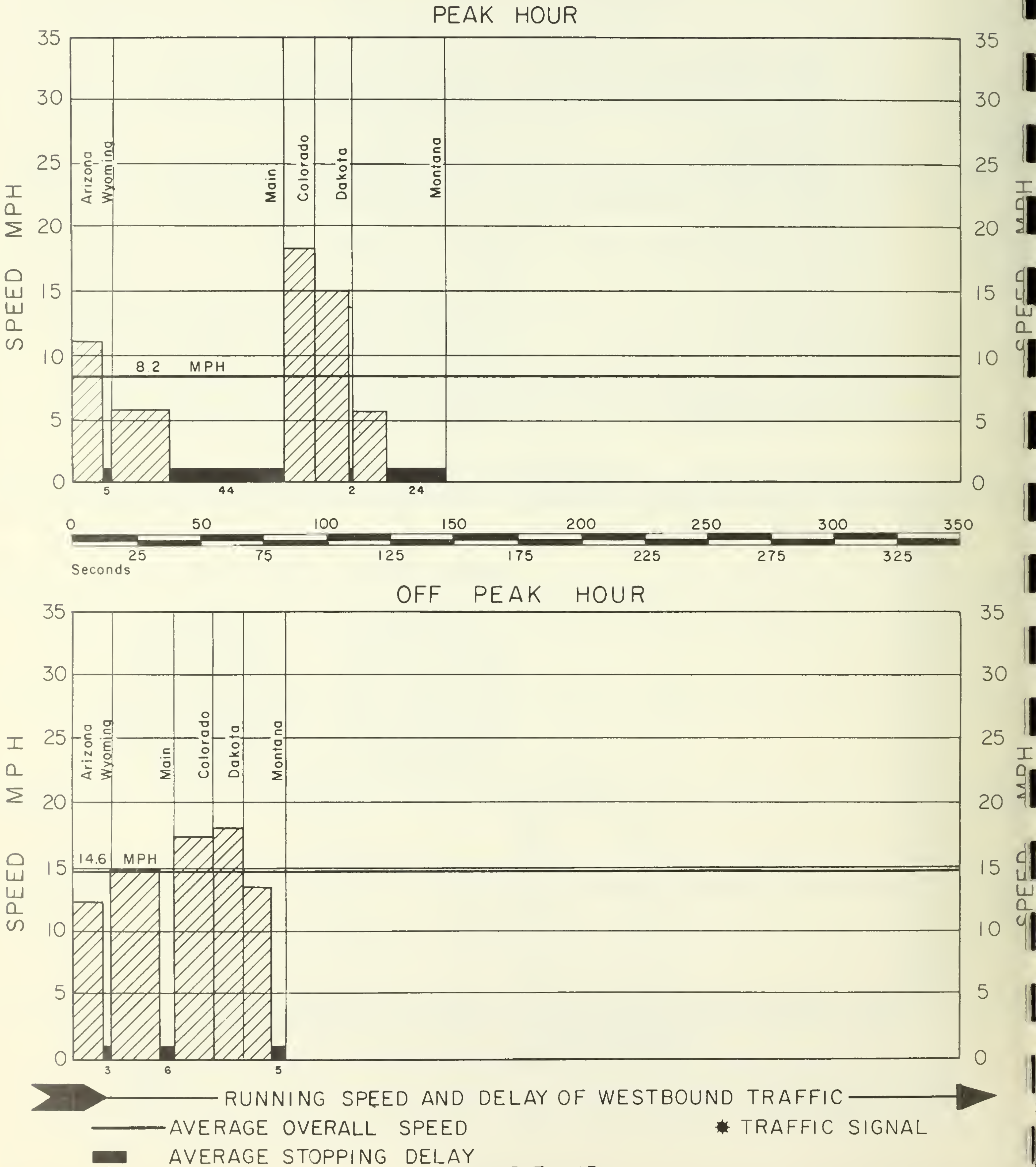


EXHIBIT 15

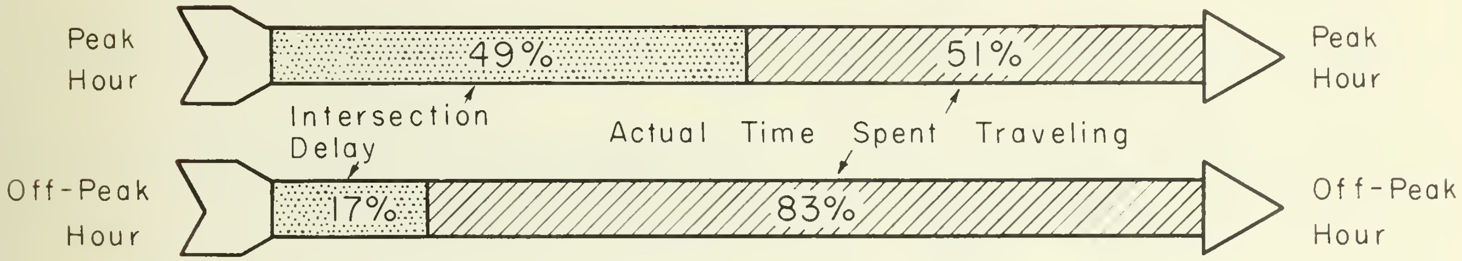
BUTTE TRAFFIC STUDY

SPEED AND DELAY

GALENA ST. BETWEEN ARIZONA AVE. AND MONTANA ST.

PERCENT TRAVEL TIME

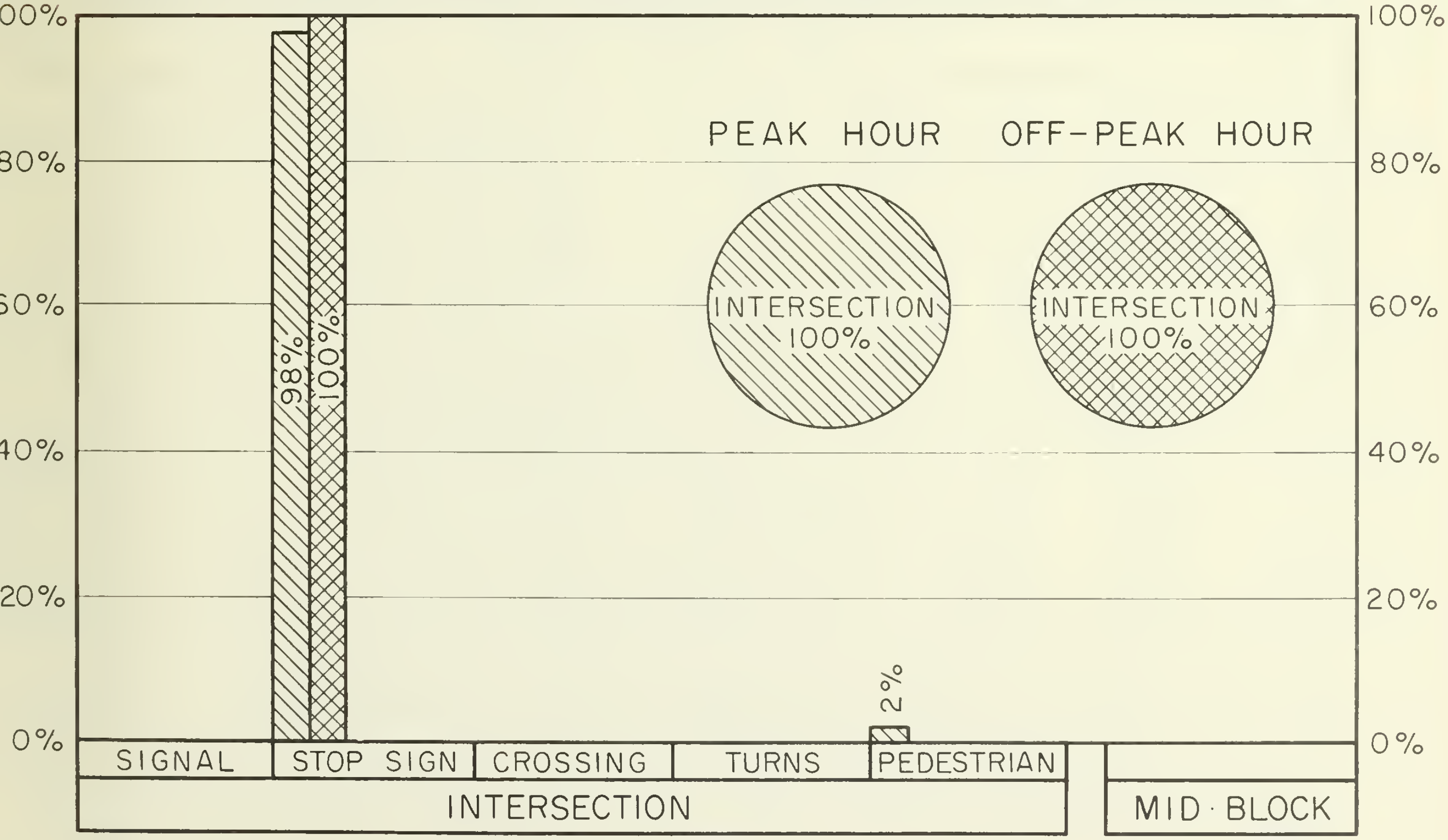
EASTBOUND TRAFFIC



LENGTH OF ROUTE = .337 MI.

	PEAK HOUR	OFF-PEAK HOUR
Average Overall Driving Time	2 Min. 27 Sec.	1 Min. 23 Sec.
Average Overall Speed	8.22 M. P. H.	14.64 M. P. H.
Average Traveling Speed	16.80 M. P. H.	17.58 M. P. H.

PERCENT DELAY



NOTE: OFF PEAK-HOUR OBSERVATIONS WERE MADE FROM 10:00 TO 11:00 A.M.
PEAK HOUR OBSERVATIONS WERE MADE FROM 4:30 TO 5:30 P. M.

EXHIBIT 16

BUTTE TRAFFIC STUDY

SPEED AND DELAY

MERCURY ST. BETWEEN WASHINGTON AND FIR STREETS

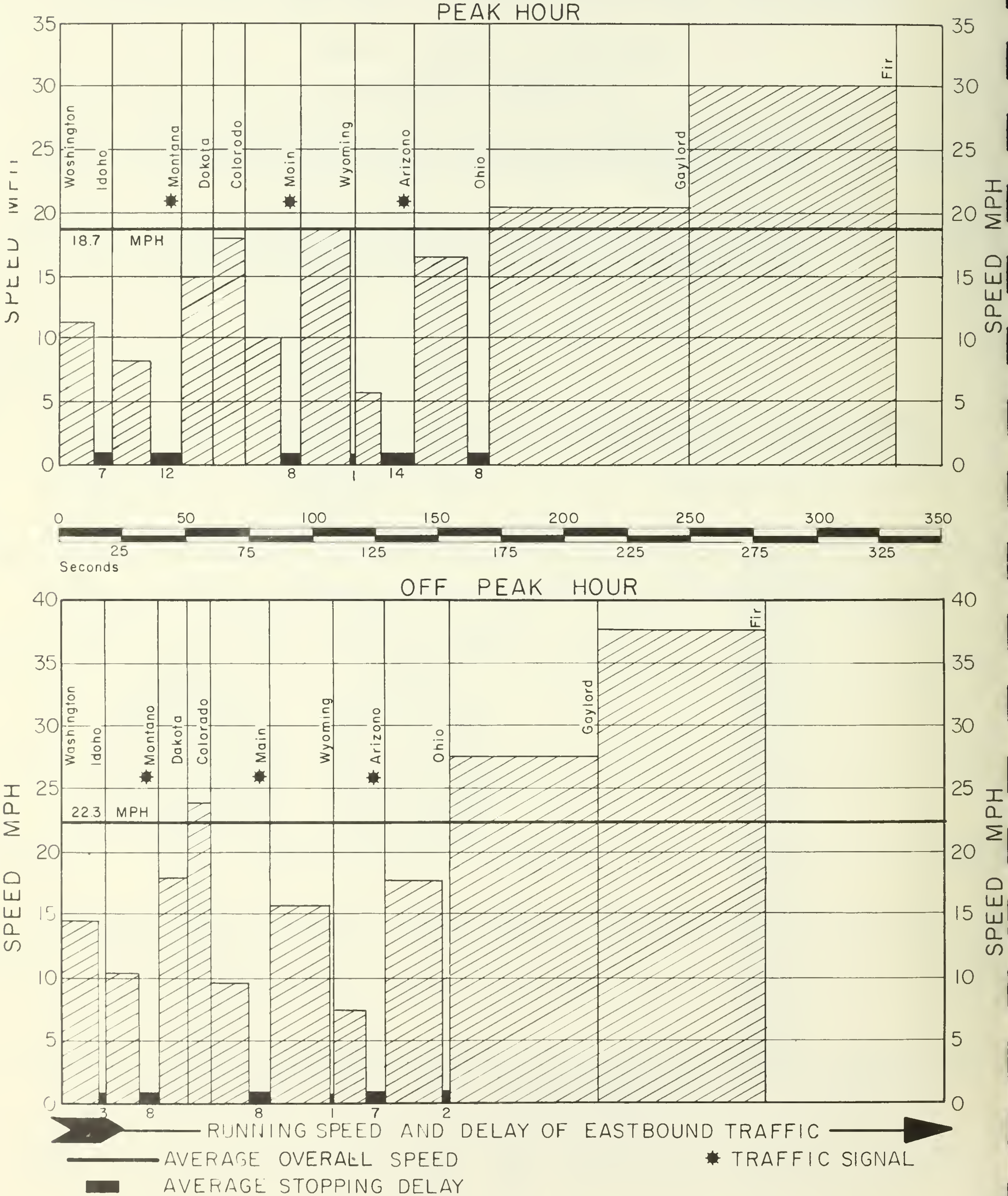


EXHIBIT 17

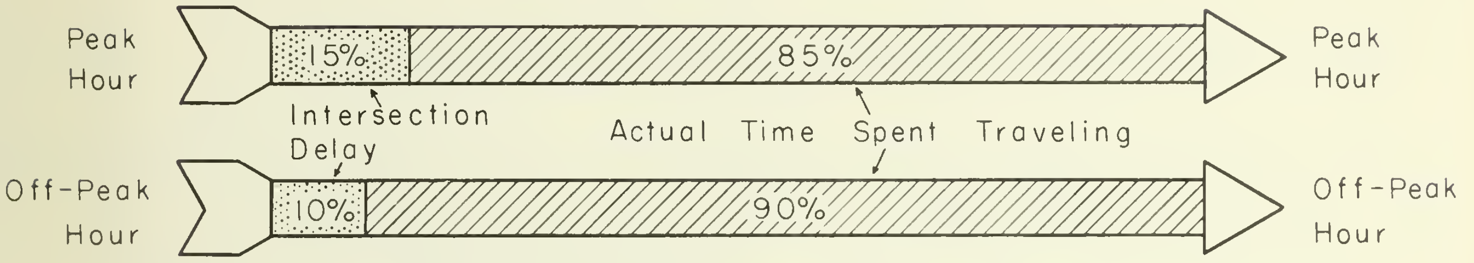
BUTTE TRAFFIC STUDY

SPEED AND DELAY

MERCURY ST. BETWEEN WASHINGTON AND FIR STREETS

PERCENT TRAVEL TIME

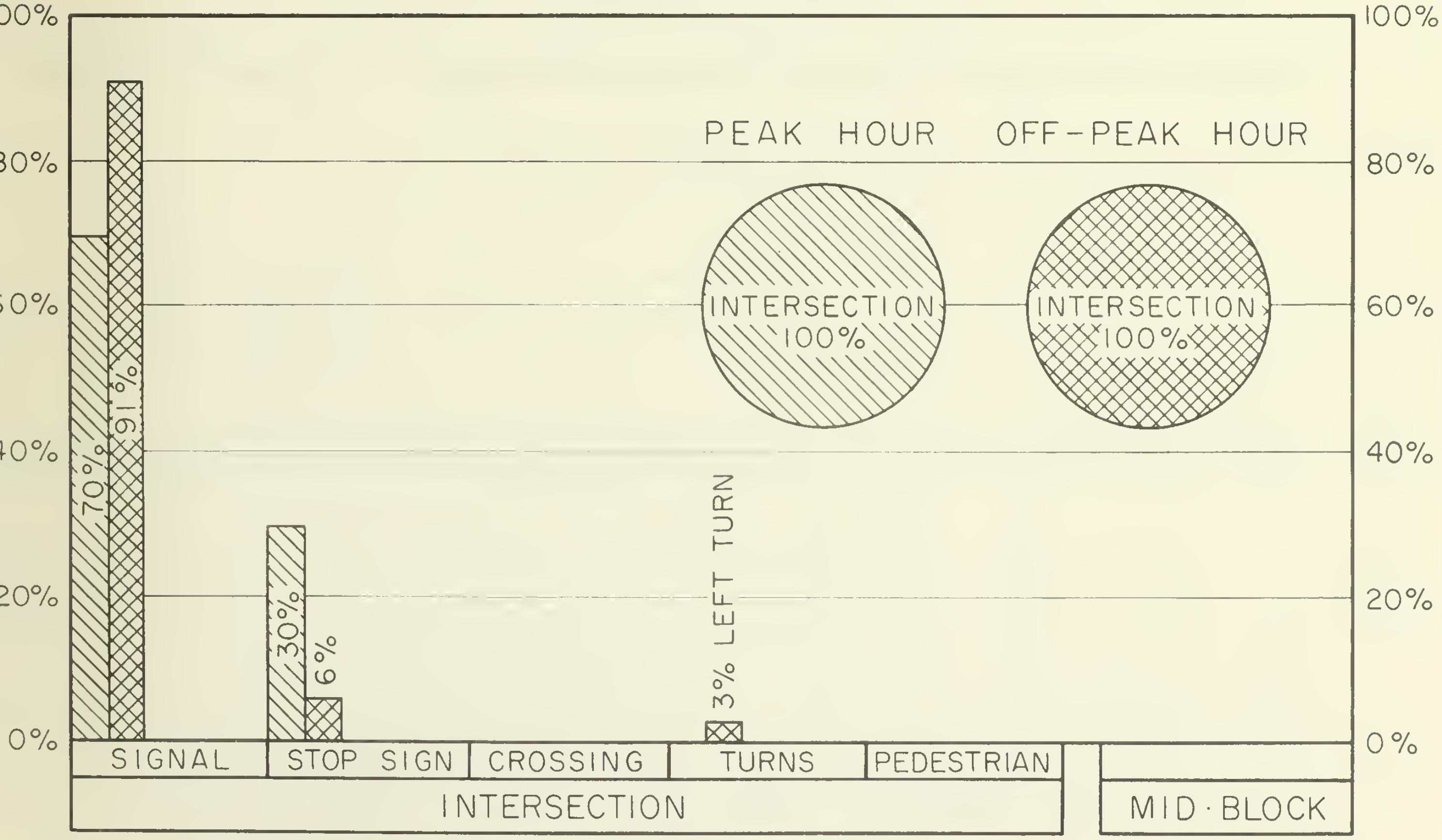
EASTBOUND TRAFFIC



LENGTH OF ROUTE = 1.724 MI.

	PEAK HOUR	OFF-PEAK HOUR
Average Overall Driving Time	5 Min. 32 Sec.	4 Min. 38 Sec.
Average Overall Speed	18.70 M.P.H.	22.32 M.P.H.
Average Traveling Speed	21.96 M.P.H.	24.90 M.P.H.

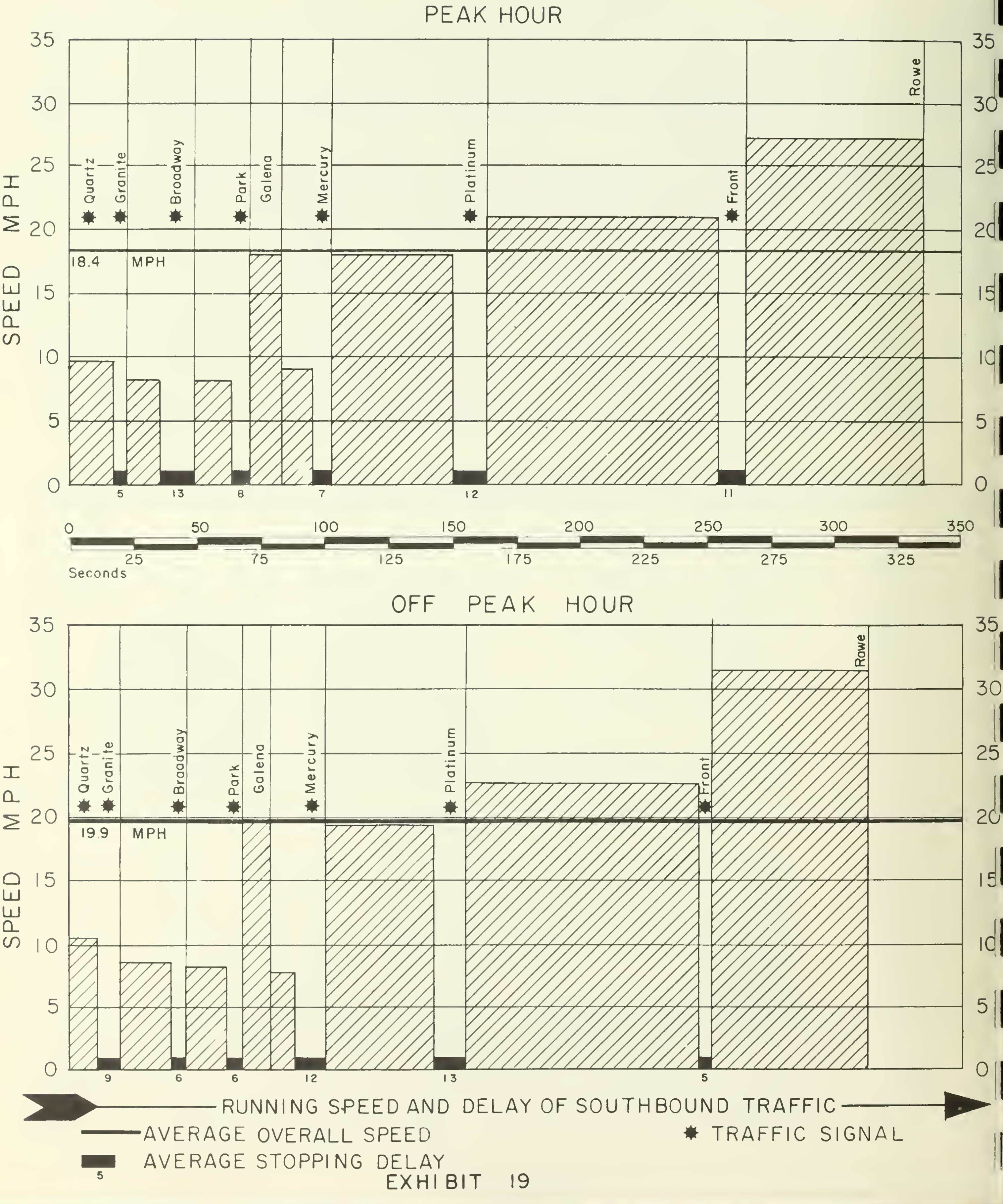
PERCENT DELAY



NOTE: OFF PEAK-HOUR OBSERVATIONS WERE MADE FROM 10:00 TO 11:00 A.M.
PEAK-HOUR OBSERVATIONS WERE MADE FROM 4:30 TO 5:30 P.M.

EXHIBIT 18

BUTTE TRAFFIC STUDY
SPEED AND DELAY
MONTANA AVE. BETWEEN QUARTZ ST. AND ROWE ROAD



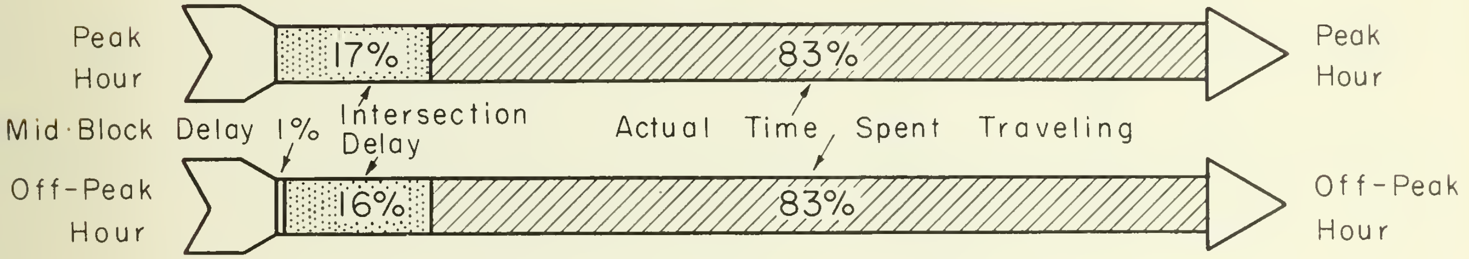
PEAK HOUR

OFF PEAK HOUR

EXHIBIT 19

BUTTE TRAFFIC STUDY
SPEED AND DELAY
MONTANA AVE. BETWEEN QUARTZ ST. AND ROWE ROAD

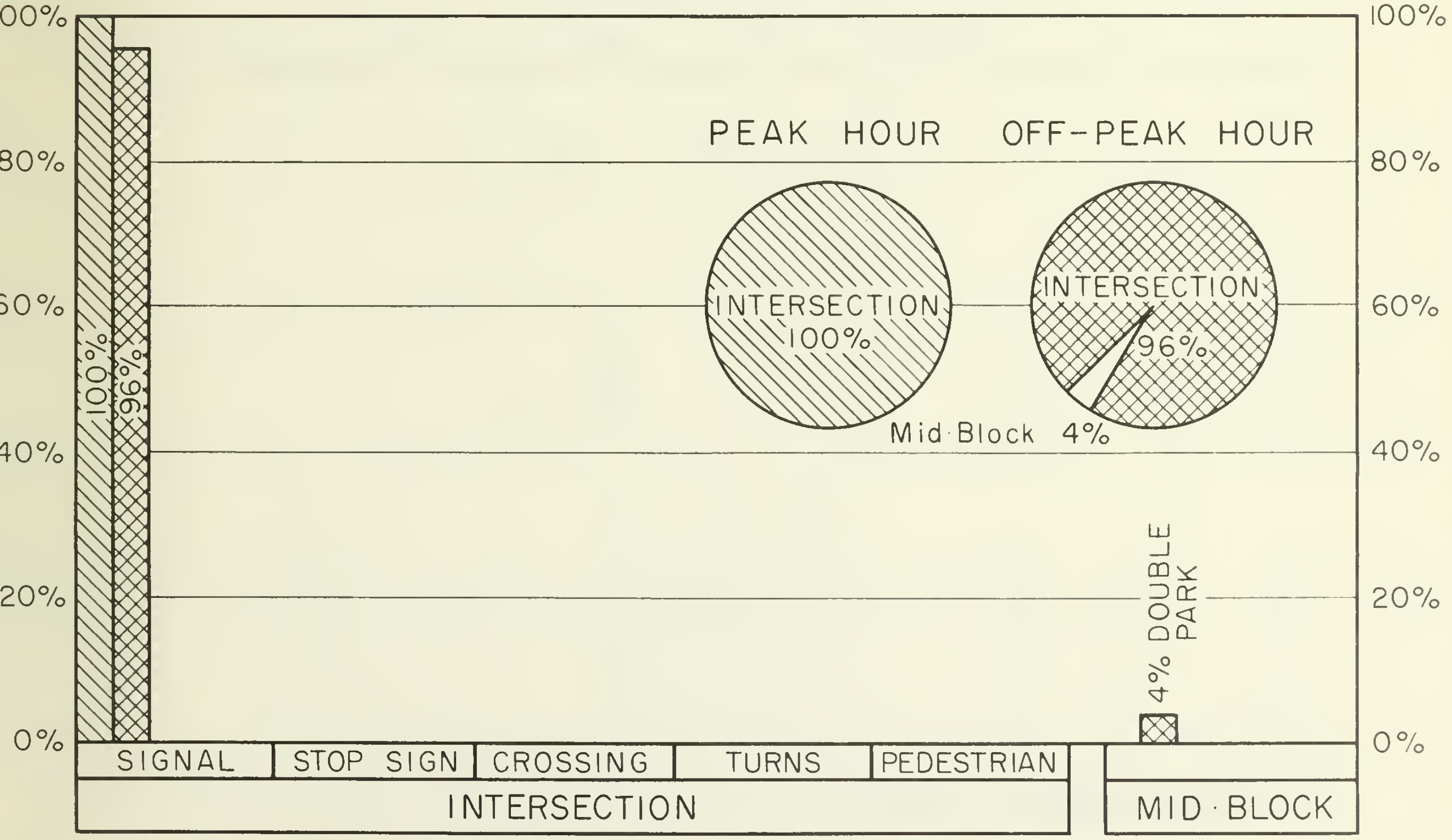
PERCENT TRAVEL TIME
SOUTHBOUND TRAFFIC



LENGTH OF ROUTE = 1.721 MI.

	PEAK HOUR	OFF-PEAK HOUR
Average Overall Driving Time	5 Min. 37 Sec.	5 Min. 15 Sec.
Average Overall Speed	18.36 M. P. H.	19.66 M. P. H.
Average Traveling Speed	22.02 M P H	23.64 M. P. H.

PERCENT DELAY



NOTE: OFF PEAK-HOUR OBSERVATIONS WERE MADE FROM 10:00 TO 11:00 A.M.
PEAK-HOUR OBSERVATIONS WERE MADE FROM 4:30 TO 5:30 P.M.

EXHIBIT 20

BUTTE TRAFFIC STUDY
SPEED AND DELAY
MAIN ST. BETWEEN QUARTZ ST. AND MARYLAND AVE.

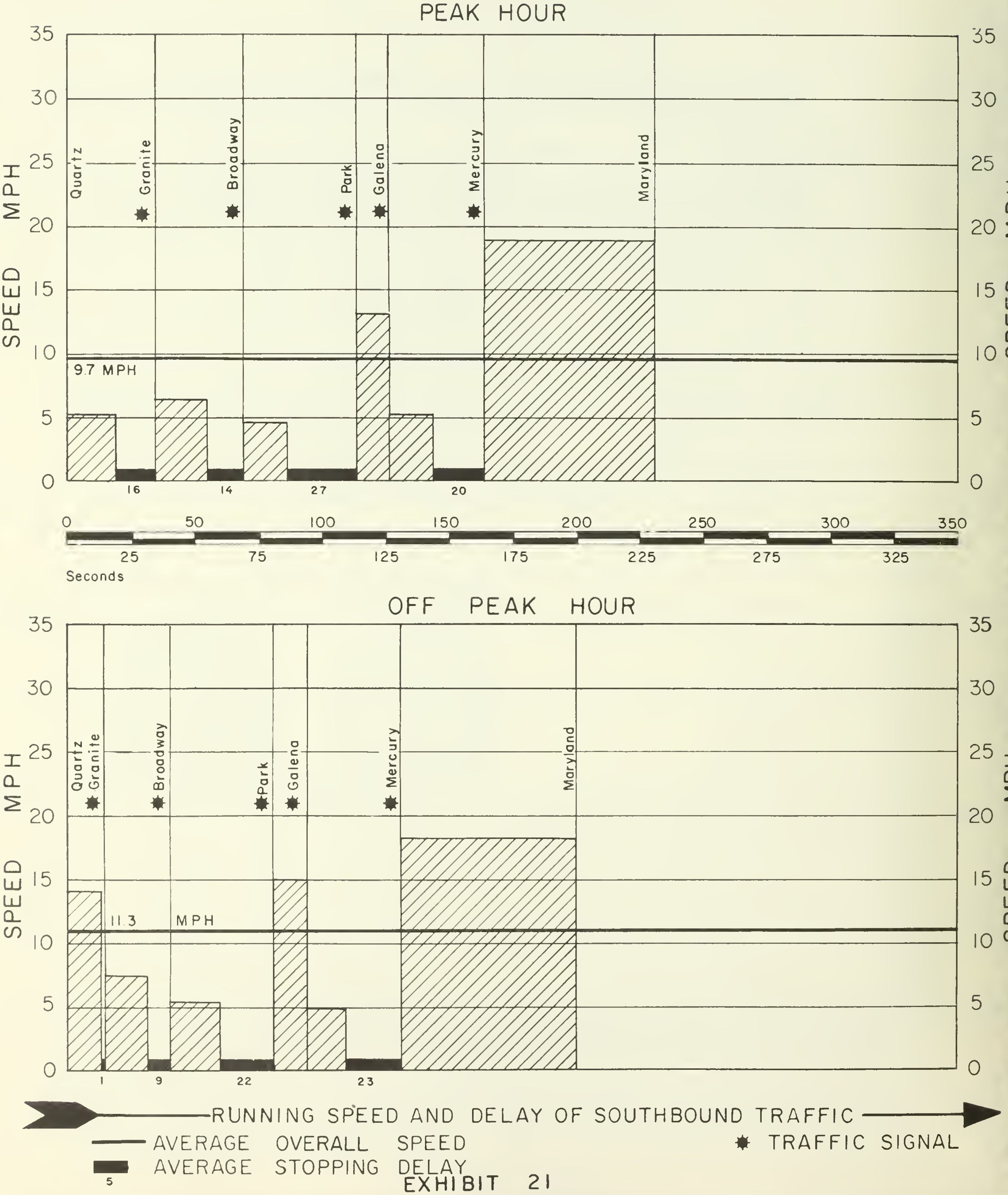


EXHIBIT 21

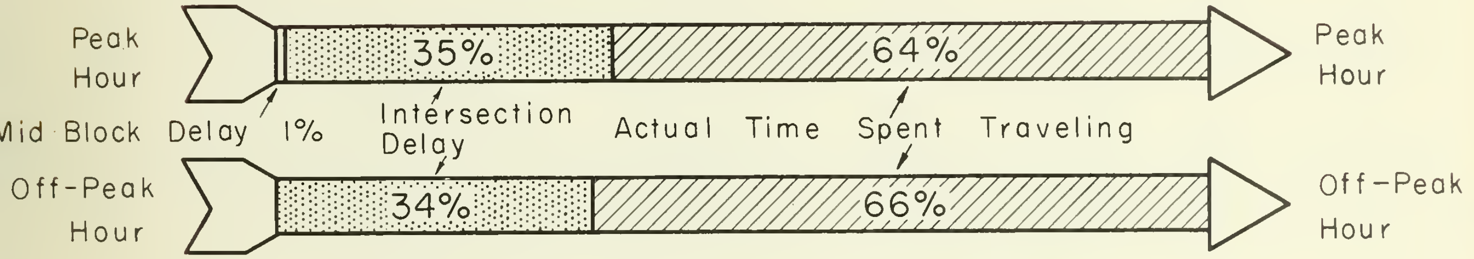
BUTTE TRAFFIC STUDY

SPEED AND DELAY

MAIN ST. BETWEEN QUARTZ ST. AND MARYLAND AVE.

PERCENT TRAVEL TIME

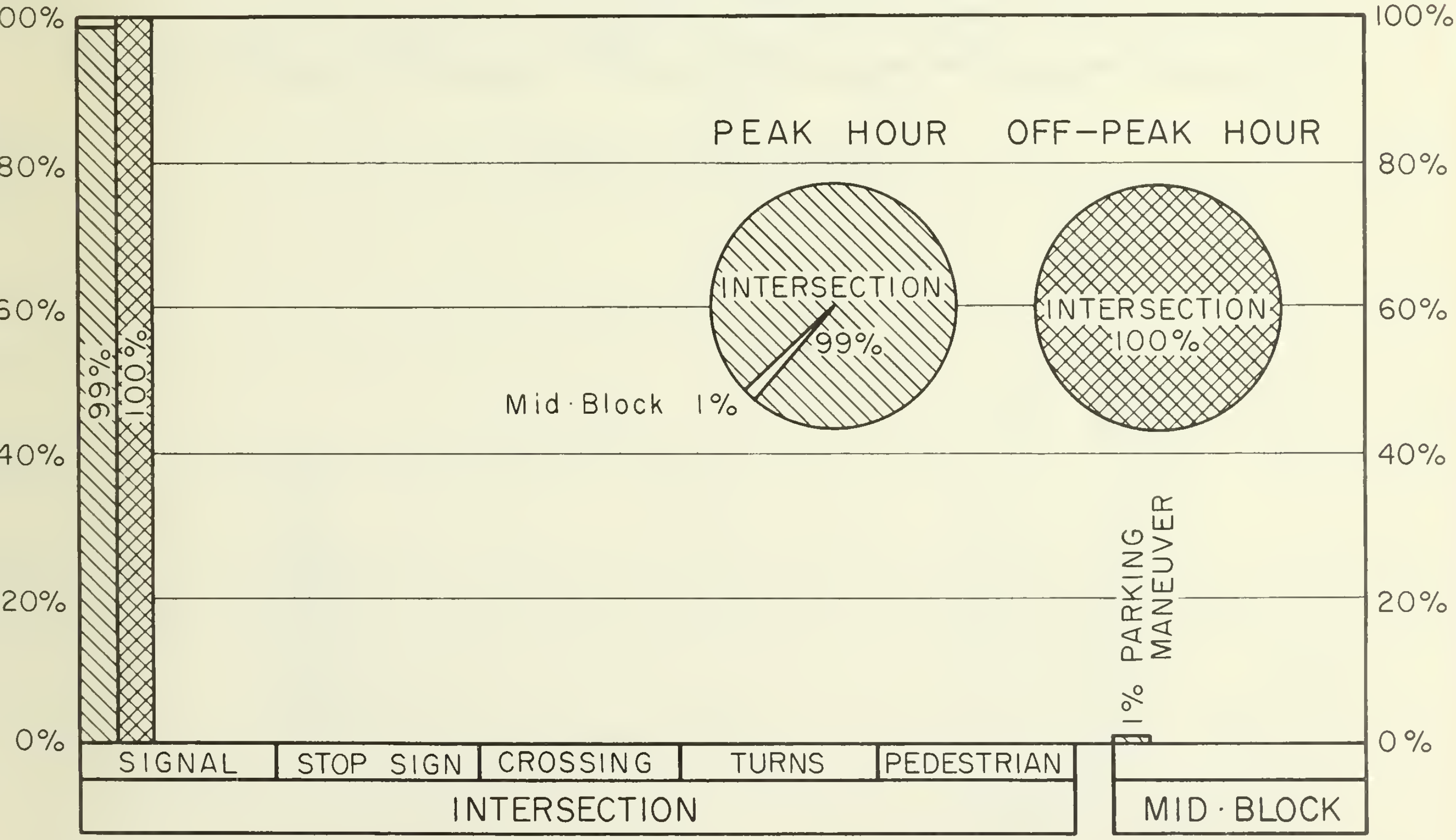
SOUTHBOUND TRAFFIC



LENGTH OF ROUTE = .623 MI.

	PEAK HOUR	OFF-PEAK HOUR
Average Overall Driving Time	3 Min. 50 Sec.	3 Min 19 Sec.
Average Overall Speed	9.75 M.P.H.	11.27 M.P.H.
Average Traveling Speed	15.24 M.P.H.	16.98 M.P.H.

PERCENT DELAY



NOTE: OFF PEAK-HOUR OBSERVATIONS WERE MADE FROM 10:00 TO 11:00 A.M.
PEAK-HOUR OBSERVATIONS WERE MADE FROM 4:30 TO 5:30 P.M.

EXHIBIT 22

BUTTE TRAFFIC STUDY
SPEED AND DELAY
WYOMING AVE. BETWEEN QUARTZ AND SILVER STREETS

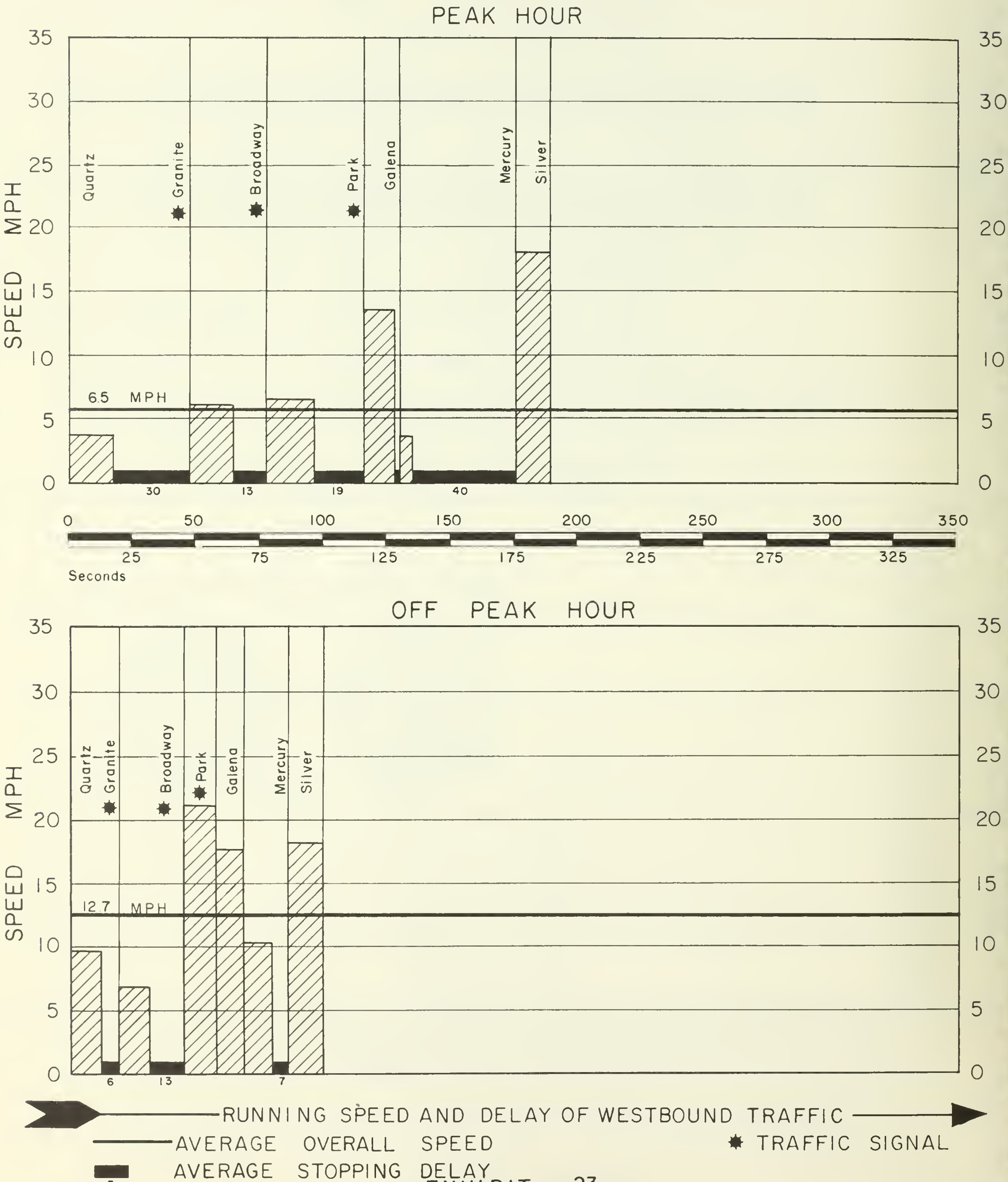


EXHIBIT 23

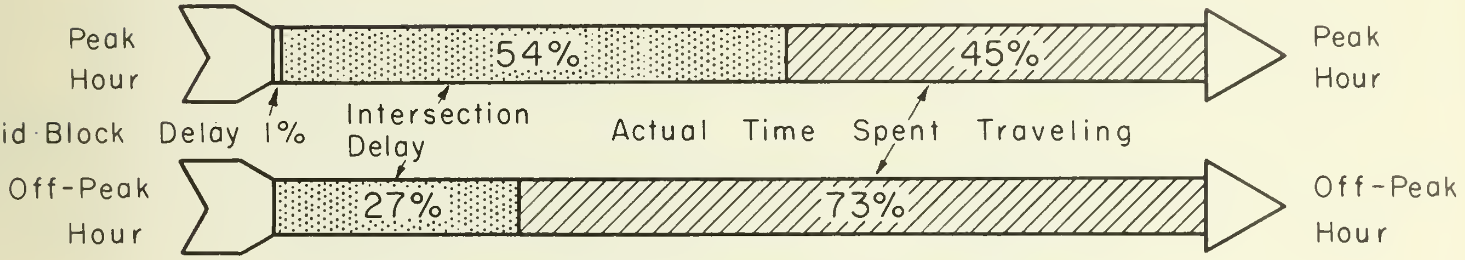
BUTTE TRAFFIC STUDY

SPEED AND DELAY

WYOMING AVE. BETWEEN QUARTZ AND SILVER STREETS

PERCENT TRAVEL TIME

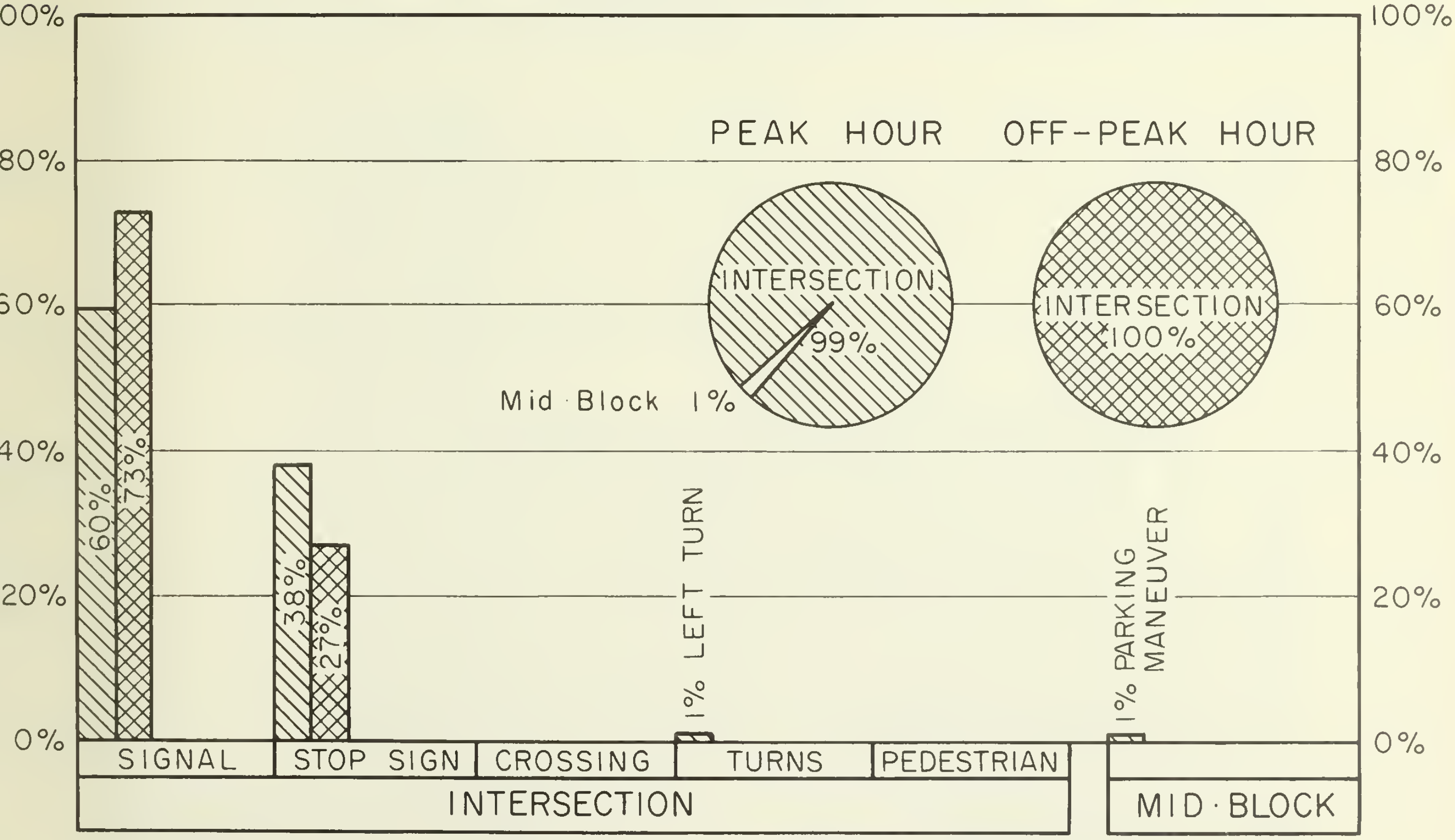
SOUTHBOUND TRAFFIC



LENGTH OF ROUTE = .346 MI.

	PEAK HOUR	OFF-PEAK HOUR
Average Overall Driving Time	3 Min. 10 Sec.	1 Min. 34 Sec.
Average Overall Speed	6.54 M.P.H.	12.72 M.P.H.
Average Traveling Speed	14.46 M.P.H.	17.28 M.P.H.

PERCENT DELAY



NOTE: OFF PEAK-HOUR OBSERVATIONS WERE MADE FROM 10:00 TO 11:00 A.M.
PEAK-HOUR OBSERVATIONS WERE MADE FROM 4:30 TO 5:30 P.M.

EXHIBIT 24

BUTTE TRAFFIC STUDY
SPEED AND DELAY
ARIZONA AVE, UTAH AVE, FRONT ST. AND HARRISON AVE. BETWEEN GRANITE ST AND DEWEY BLVD.

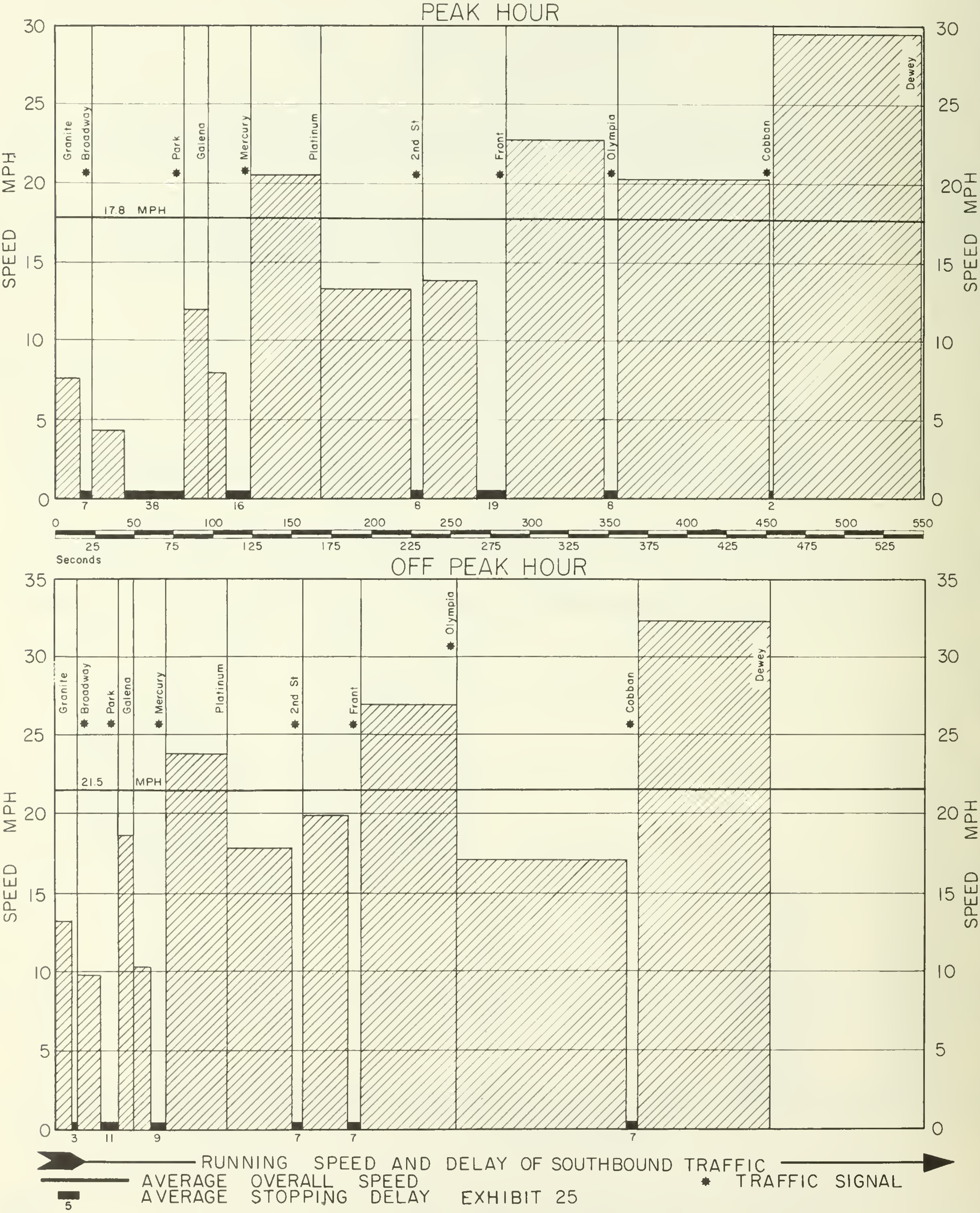
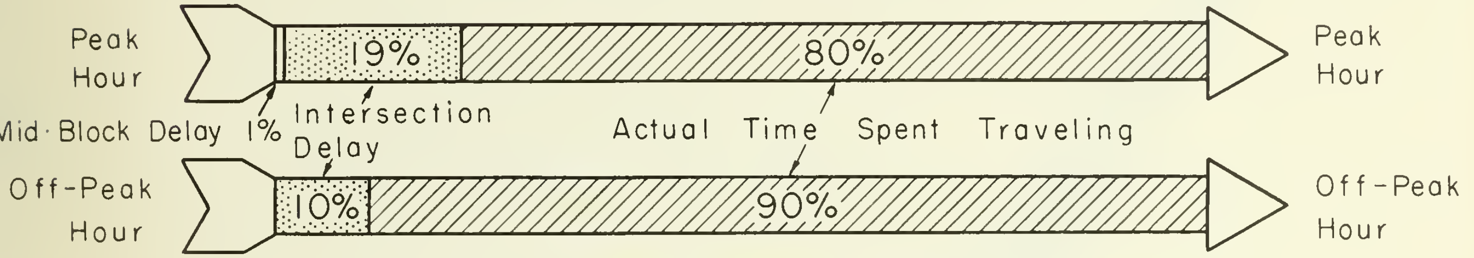


EXHIBIT 25

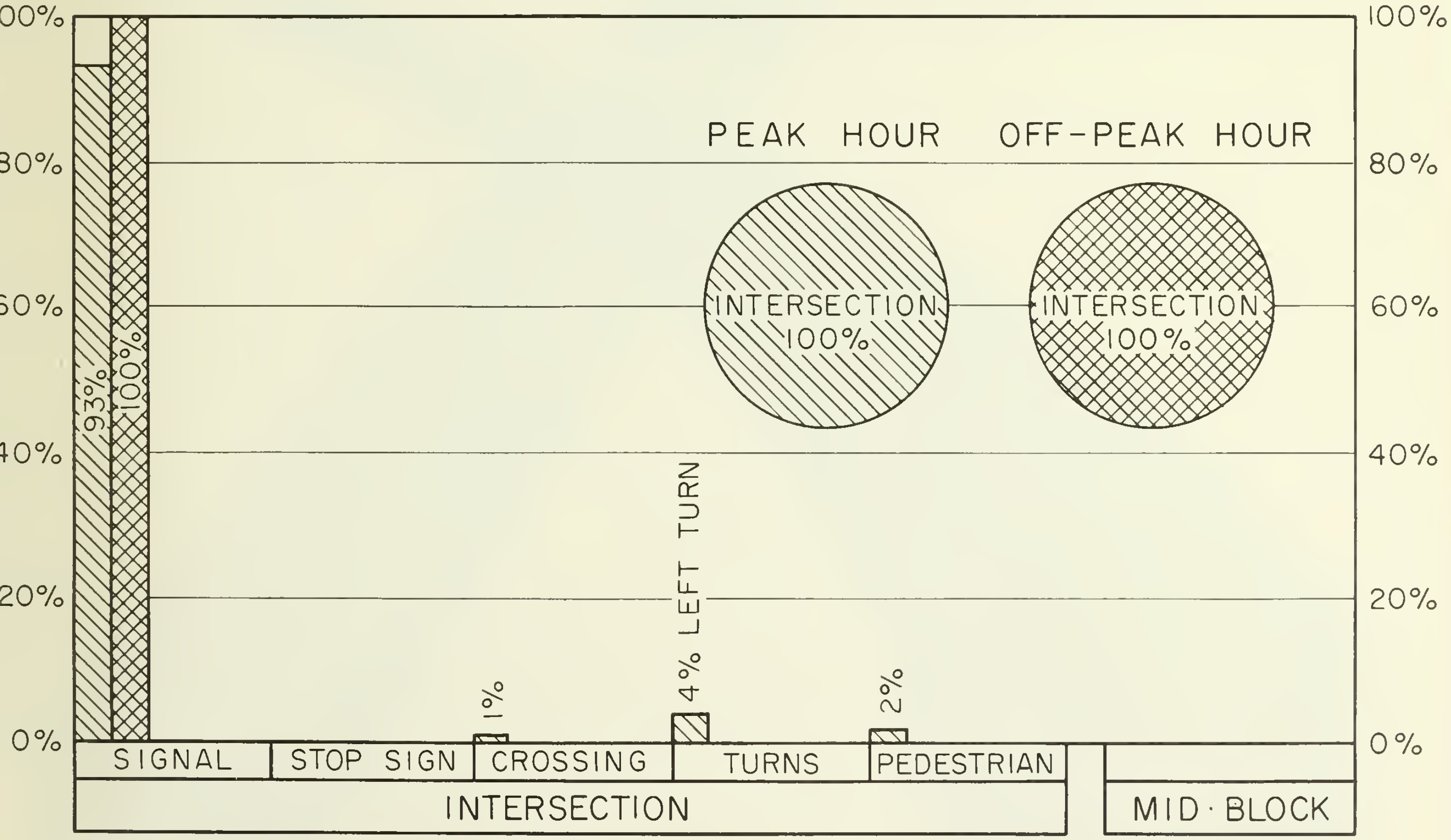
BUTTE TRAFFIC STUDY
SPEED AND DELAY
ARIZONA AVE, UTAH AVE, FRONT ST, AND HARRISON AVE BETWEEN GRANITE ST AND DEWEY BLVD.
PERCENT TRAVEL TIME
SOUTHBOUND TRAFFIC



LENGTH OF ROUTE = 2.710 MI.

	PEAK HOUR	OFF-PEAK HOUR
Average Overall Driving Time	9 Min. 7 Sec.	7 Min. 32 Sec.
Average Overall Speed	17.82 M. P. H.	21.54 M. P. H.
Average Traveling Speed	21.96 M. P. H.	24.06 M. P. H.

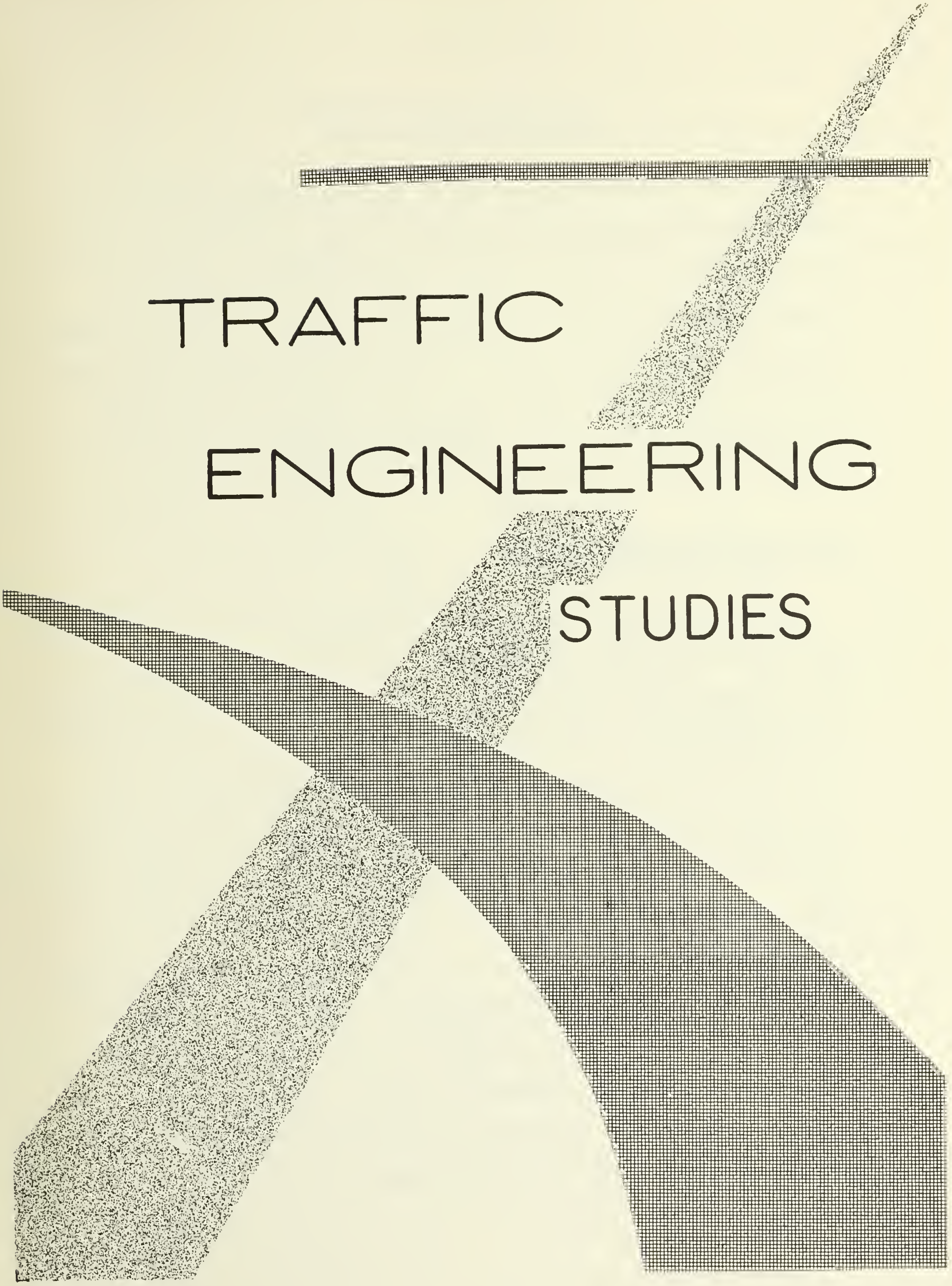
PERCENT DELAY



NOTE: OFF PEAK-HOUR OBSERVATIONS WERE MADE FROM 10:00 TO 11:00 A.M.
PEAK-HOUR OBSERVATIONS WERE MADE FROM 4:30 TO 5:30 P. M.

EXHIBIT 26

TRAFFIC ENGINEERING STUDIES



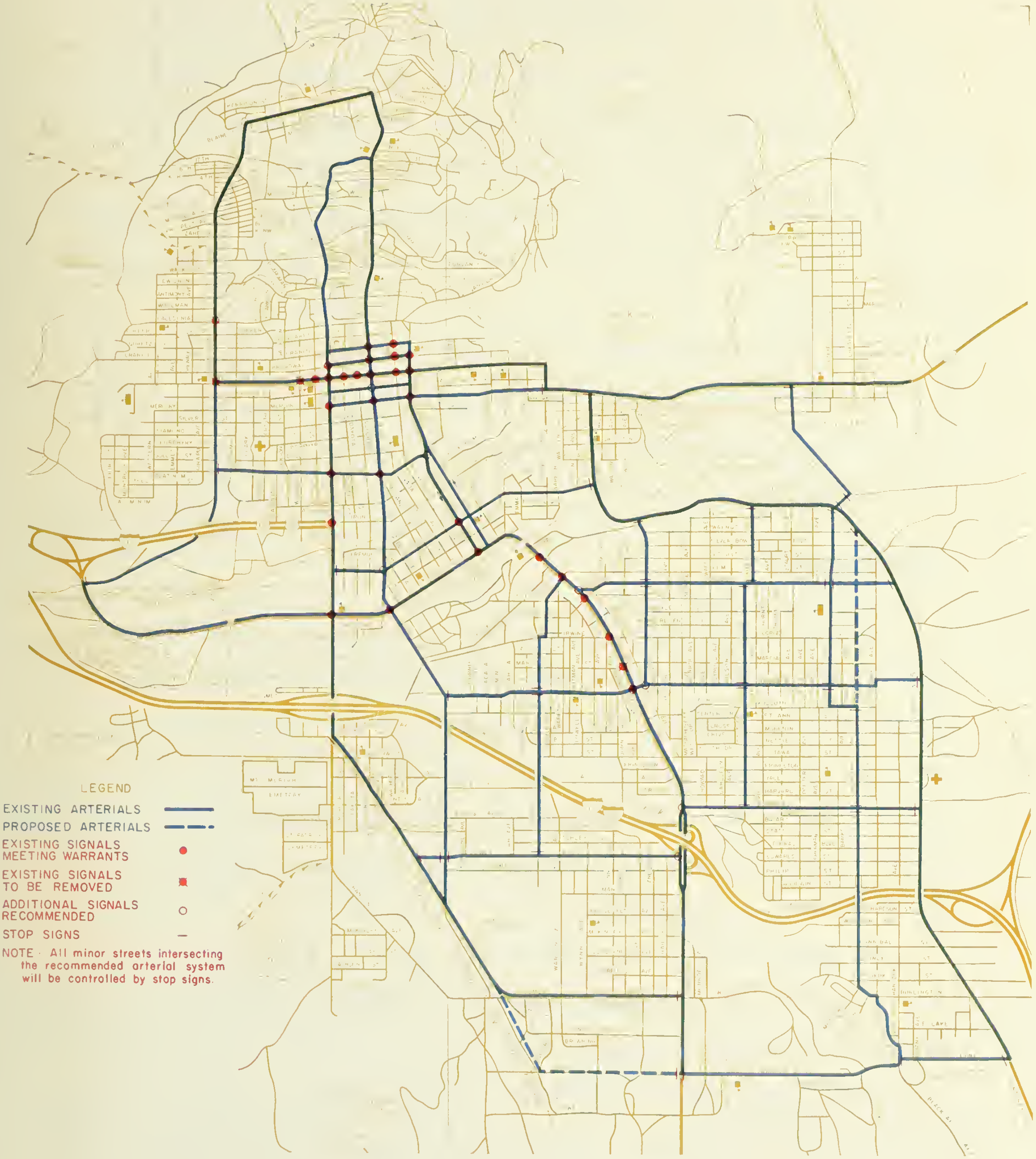
TRAFFIC ENGINEERING STUDIES

The traffic Engineering Section, of the State Highway Department, was asked to generally study the major street system as well as specific locations in the Butte Metropolitan Area. These studies have been made and recommendations developed to improve traffic conditions. Specific recommendations on traffic signals are made in the following chapter of this report. General recommendations for both signals and arterial street operations will be discussed in this chapter and are illustrated in Exhibit 27 on page 39.

PARK STREET AND BROADWAY COUPLET

This one-way couplet was placed in operation in 1956 between Montana Street and Arizona Avenue. Park Street is the principal commercial arterial through the central business district and is the designated routing of FAP 3 and US 91.

The couplet has operated less than satisfactorily the past 10 years due primarily to the poor transition, improper signing, and the resulting congestion at the eastern terminus. Westbound traffic on Park Street (US 91) is now forced to turn north up a narrow, steep grade on Arizona Avenue to Broadway. A left turn at the signal on Broadway is then necessary to proceed west on the westbound section of the couplet between Arizona Avenue and Montana Street. This transition from two to one-way operation is particularly confusing to tourists entering Butte from the east on US 91. This fact is confirmed by the numerous wrong-way movements observed at the intersection of Park Street and Arizona Avenue.



LEGEND	
EXISTING ARTERIALS	━━
PROPOSED ARTERIALS	━ ━ ━
EXISTING SIGNALS MEETING WARRANTS	●
EXISTING SIGNALS TO BE REMOVED	■
ADDITIONAL SIGNALS RECOMMENDED	○
STOP SIGNS	—

NOTE · All minor streets intersecting the recommended arterial system will be controlled by stop signs.

BUTTE TRAFFIC ENGINEERING STUDY
RECOMMENDED ARTERIALS
AND
TRAFFIC CONTROL DEVICES

EXHIBIT 27

Traffic capacity studies of intersections in the central business district indicate that there is sufficient traffic capacity available to change back to two-way operation on Broadway and Park Streets. It is, therefore, recommended that this change be made.

The present 60-foot width of Park Street can provide 4 traffic lanes 11-feet wide and 2 parking lanes 8-feet wide as shown in Exhibit 28 on the opposite page.

It is considered essential that double parking be eliminated if Park Street is to function properly as a four-lane facility. Periodic striping of lanes and parking stalls will also help to position the traffic and reduce congestion.

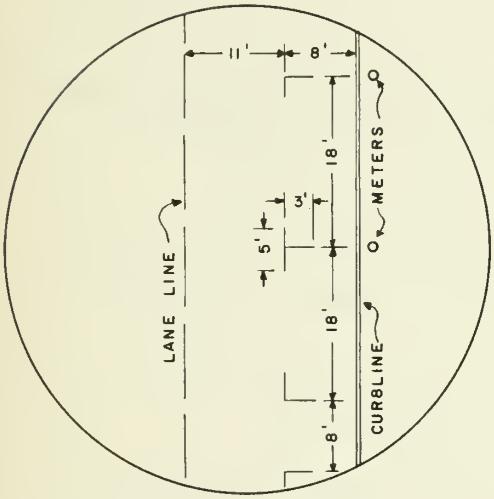
HARRISON AVENUE

This major north-south avenue will probably become the most important arterial in Butte after the Interstate System is completed. It is presently carrying traffic volumes ranging from 6,700 vehicles per day south of Interstate 15 and 90 to 21,000 vehicles per day near the Civic Center on the north. It is expected that these traffic volumes will increase substantially after all segments of the Interstate System in the Butte area are in operation.

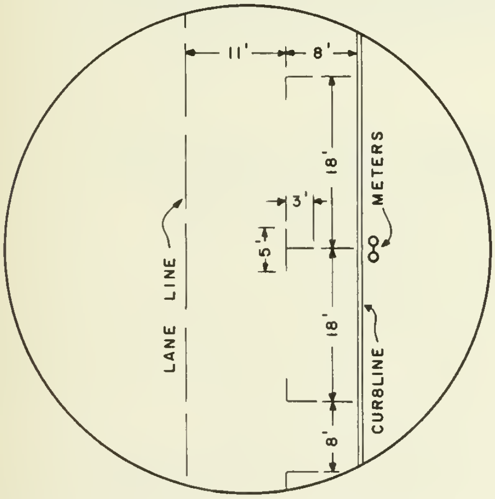
The present curb-to-curb width of this facility varies from 70-feet to 55-feet with parallel parking permitted on both sides. The 55-foot street section which is approximately 1,100 feet long is located between Driggs and George Streets. This narrow segment of Harrison Avenue is a definite traffic bottleneck. Traffic is also impeded by the unlimited access from Harrison Avenue to the Post Office and Shopping Center located

BUTTE TRAFFIC ENGINEERING STUDY

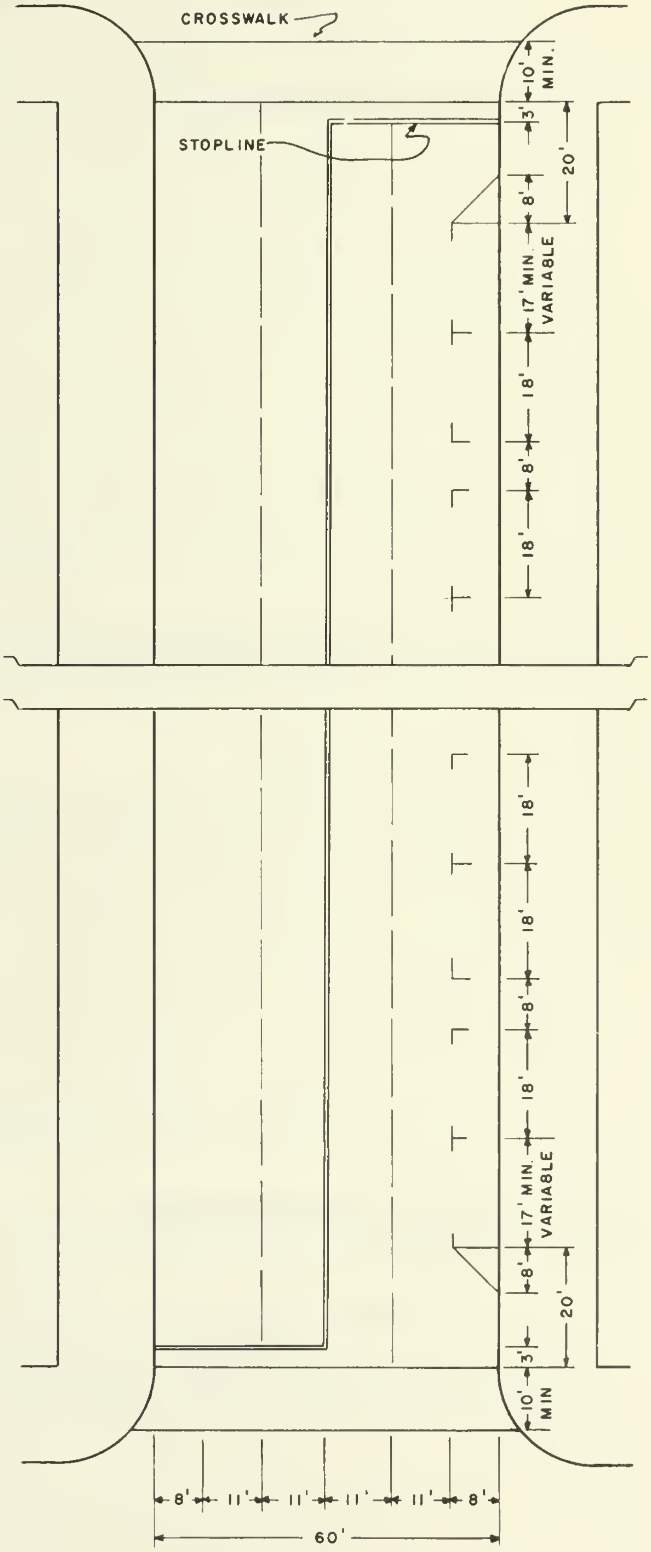
RECOMMENDED
PAVEMENT MARKING LAYOUT
PARK STREET



DETAIL OF "PAIRED" PARALLEL PARKING - "T" TYPE STALL MARKINGS - ONE METER STANDARD FOR EACH VEHICLE.



DETAIL OF "PAIRED" PARALLEL PARKING - "T" TYPE STALL MARKINGS - ONE METER STANDARD FOR TWO VEHICLES AND TWO METERS.



PAVEMENT MARKING SPECIFICATIONS

CENTER LINE - TWO SOLID 4" YELLOW LINES SEPARATED BY A 4" SPACE.

LANE LINES - BROKEN OR SOLID 4" WHITE LINES.

STOP LINE - ONE SOLID WHITE LINE NOT LESS THAN 12" WIDE.

CROSS WALK LINE - ONE SOLID WHITE LINE NOT LESS THAN 4" OR MORE THAN 12" WIDE.

PARKING STALL LINE - ONE SOLID WHITE LINE NOT LESS THAN 4" WIDE OR MORE THAN 6" WIDE.

EXHIBIT 28

to the west and just south of the Northern Pacific Railway. In order to improve the traffic capacity of this facility so that it will be able to handle anticipated future volumes, the following recommendations should be implemented as quickly as possible.

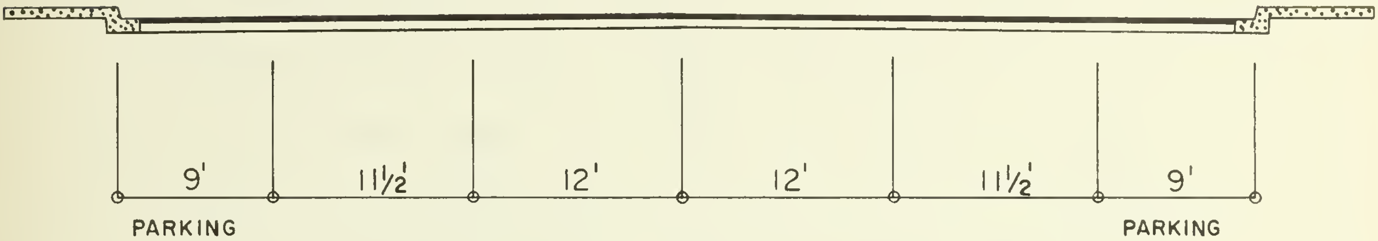
1. The 55-foot section between Driggs and George Streets should be widened a minimum of 10-feet or parking should be immediately removed on the east side to provide four-lanes of moving traffic. Exhibit 29 on page 43 illustrates the recommended lane arrangements for various typical sections on Harrison Avenue.
2. All traffic control devices including signals should be modernized to conform to the Manual on Uniform Traffic Control Devices for Streets and Highways. Signals should be interconnected to move traffic more efficiently and safely.
3. Access to the Post Office and Shopping Center west of the Civic Center should be restricted and the parking lot rearranged as shown in Exhibit 30 on page 44.
4. The 15 mile per hour speed zones now in place should be removed. Speeds of 15 miles per hour on this major arterial are unrealistic and are, therefore, unenforceable.

ARIZONA AND UTAH AVENUES

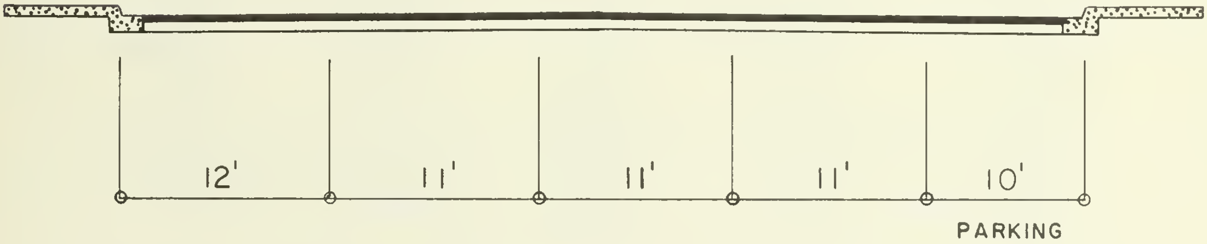
These important north-south arterials are carrying a large portion of the traffic now using Harrison Avenue enroute to the central business

BUTTE TRAFFIC STUDY
PROPOSED LANE AND PARKING ARRANGEMENTS
ON
TYPICAL WIDTHS OF HARRISON AVENUE

65'



55'



70'

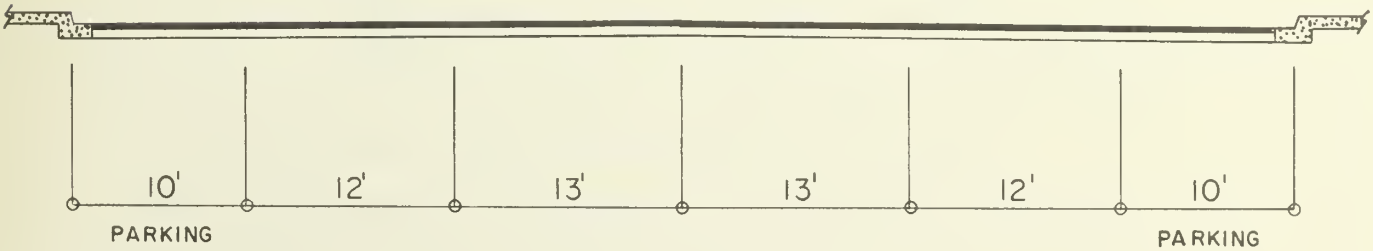


EXHIBIT 29

MONTANA [illegible]
TRAFFIC [illegible]
PRELIM[illegible] DESIGN
PROJECT N BUTTE TRAFFIC STUDY
LOCATION HARRISON AVENUE
[illegible] BY JWH. 3-26-66
DRAWN TC. 3-28-66
APPROVED BY

NOTE:
All stalls are 8.5' x 18.0'

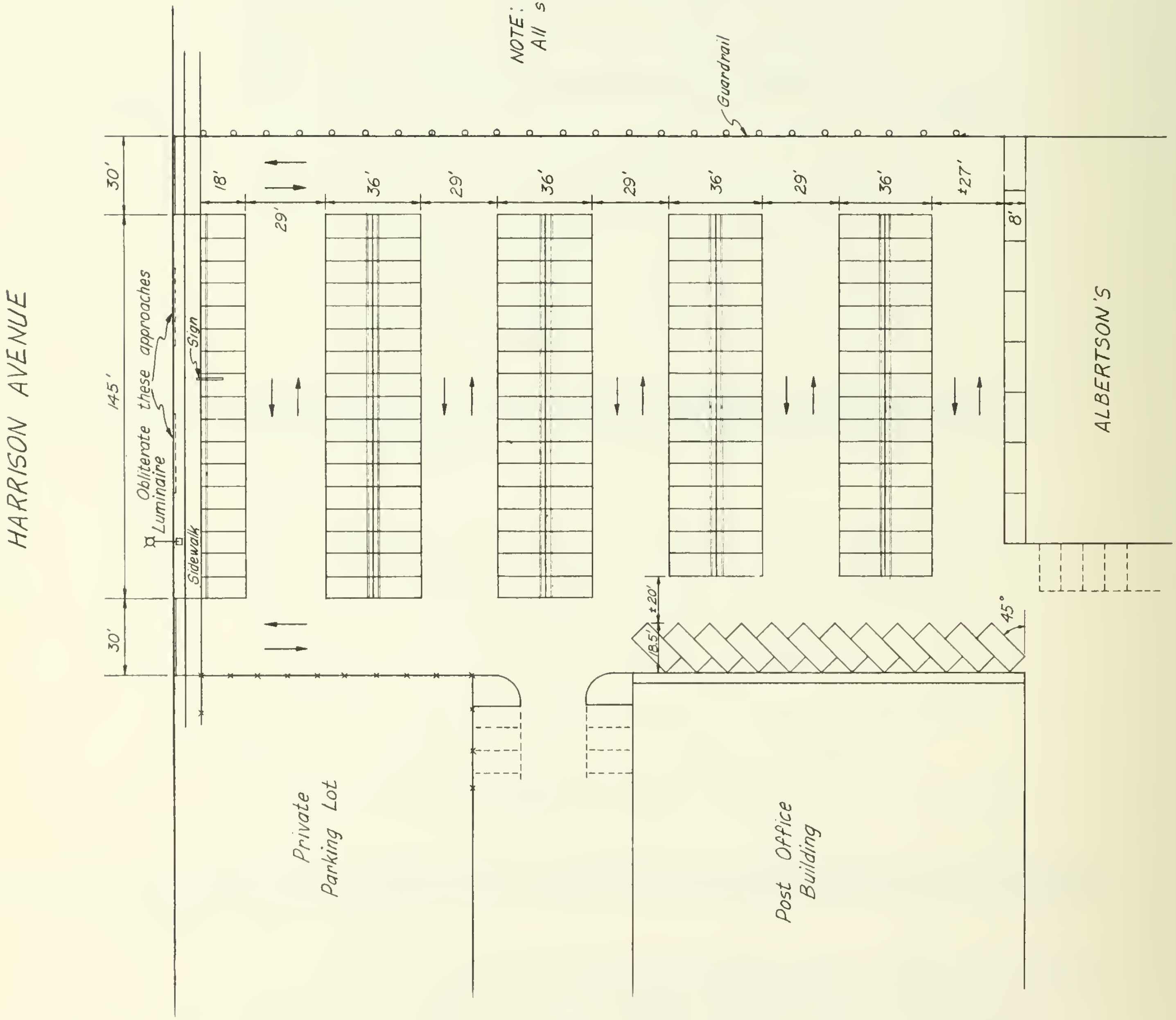


EXHIBIT 30

district. Present traffic volumes of from 9,600 to 12,000 vehicles per day are badly overloading Utah Avenue during peak hours.

In order to alleviate the present congestion and provide capacity for future traffic volumes, it is recommended that Utah and Arizona Avenues be converted to a one-way couplet from their intersection on the north to Front Street. Arizona Avenue from Utah Avenue to Park Street should also be converted to a four-lane facility by restricting parking on one side.

It will be noted that a natural transition presently exists on the north end of the proposed couplet. A signal installation and channelization will be required at the transition as shown in Exhibit 31 on page 46. Resurfacing of Arizona Avenue from Utah Avenue to Front Street is also considered necessary in the near future.

MONTANA STREET

This major arterial is functioning as one of the principal access streets from Interstate Routes 15 and 90 to the central business district. Traffic volumes on this four-lane facility presently range from 6,200 just north of the Interstate interchange to 13,400 just south of Park Street. After the completion of the Interstate System east of Butte, it is anticipated that these traffic volumes will increase substantially.

Severe subbase settlement combined with inadequate and obsolete traffic control devices are the two major deficiencies of this facility. Angle parking is also being premitted between Porphyry and Park Streets on the east and between Mercury and Park Streets on the west.

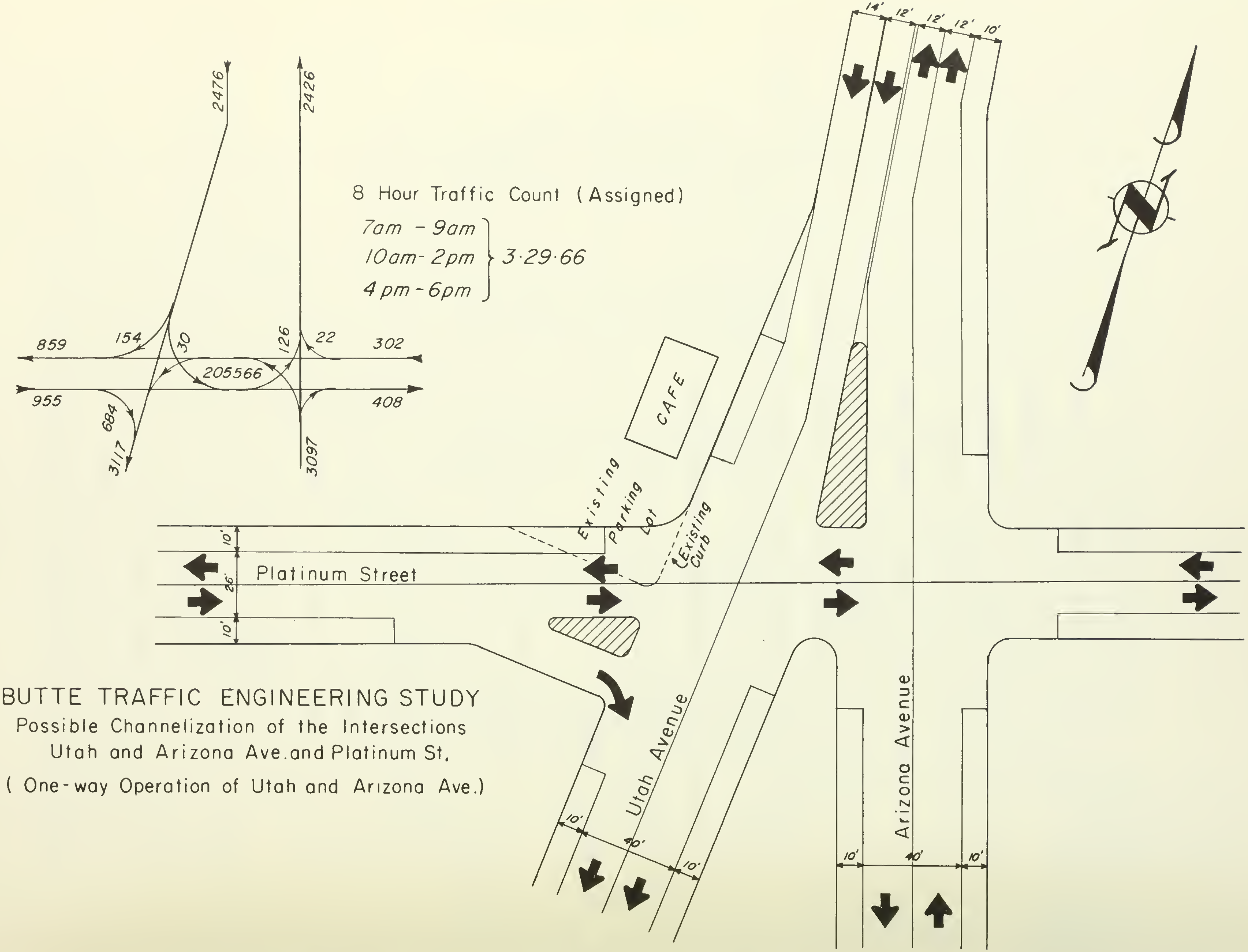
Montana Street should be completely reconstructed to a four-lane standard between the Interstate interchange and Park Street. Future

EXHIBIT 31

BUTTE TRAFFIC ENGINEERING STUDY

Possible Channelization of the Intersections
Utah and Arizona Ave. and Platinum St.
(One-way Operation of Utah and Arizona Ave.)

8 Hour Traffic Count (Assigned)
7am - 9am
10am - 2pm } 3·29·66
4 pm - 6pm



reconstruction should include the modernization of signals and all other traffic control devices. Some widening may be required on the 61-foot section between Gold and Aluminum Streets and from Iron Street south, if parking is permitted on both sides.

The angle parking, now being permitted on the 76-foot section of Montana Street between Porphyry and Park Streets, should be changed to parallel to provide adequate street width for four-lanes of moving traffic and to improve the traffic capacity and sight distance at the intersection of Park Street. There are now 70 public and 3 special permit angle parking spaces in the three blocks from Porphyry to Park Street. The recommended change to parallel parking in this area will mean the loss of about 34 curb parking spaces that probably can be provided by the development of off-street parking on the east side of Montana Street between Mercury and Galena Streets.

ROWE ROAD AND HOLMES AVENUE

These arterials are designated as the approved routing of FAP 2 (US 10) from Montana Street to Harrison Avenue. Present traffic volumes range from 1,650 to 2,700 vehicles per day. The original construction of the present 22-foot concrete pavement dates back to the horse and buggy era of 1923. It is believed that the present narrow roadway combined with the numerous posted school crossings tend to discourage traffic from using this route.

In order to relieve Harrison Avenue of a portion of its heavy traffic load, it is recommended that Rowe Road and Holmes Avenue be reconstructed to a 44-foot width. This width will provide two 24-foot driving lanes and a 10-foot parking lane on each side. It will also provide four 11-foot driving lanes with no parking if future traffic volumes justify four-lane operation.

An alternate plan should also be considered for future development. This plan proposes the extension of Rowe Road in a southeasterly direction on its present tangent to an intersection with a westerly extension of Elizabeth Warren Drive (Heman Street) as shown in Exhibit 27 on page 39. One of the main advantages of this plan is to provide a direct route from the rapidly devloping residential area near the Country Club to West Butte and the central business district. This routing should also relieve Harrison Avenue of a large portion of its commuter traffic.

Rights-of-way required for the proposed extensions of Rowe Road and Elizabeth Warren Drive are not developed extensively at the present time. It is, therefore, recommended that if this proposal is adopted the necessary rights-of-way be secured at once to save paying for future development.

ELIZABETH WARREN DRIVE - LOFTER LANE

A through, direct route from Continental Drive to Harrison Avenue is considered essential in this general area and these two streets appear to be the most logical for arterial development. Some reconstruction of Lofter Lane near Continental Drive will be required and the resurfacing of both streets is considered necessary.

Preferential treatment in the movement of traffic on Elizabeth Warren Drive should be provided by the installation of standard stop signs on all intersecting streets with the exception of Harrison Avenue. Lofter Lane should be designated as a through street between Continental Drive and Elizabeth Warren Drive.

MAIN STREET, KAW AVENUE AND LEXINGTON STREET

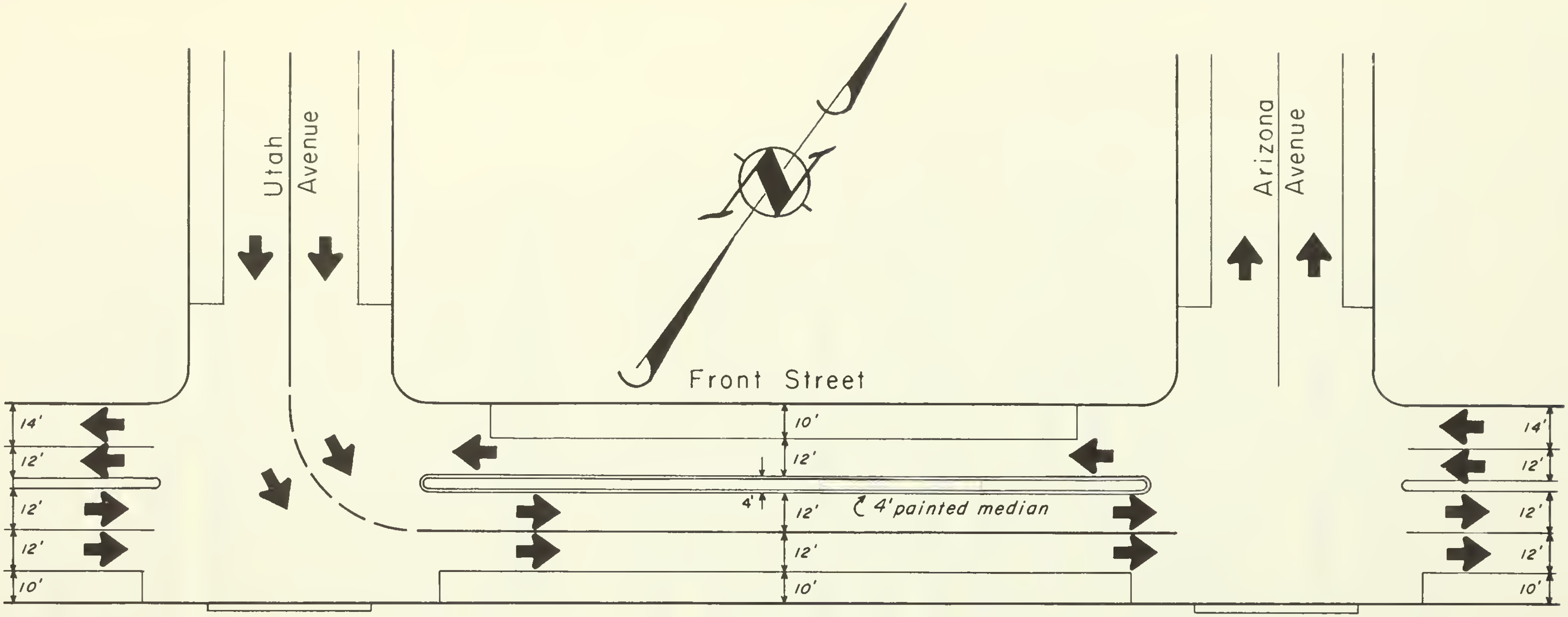
These three arterials combine to form a very important north-south route connecting the residential areas both north and south of the Interstate System with the central business district.

Lexington Street is one of only two streets that cross Interstate 15 and 90 between the Montana Street and the Harrison Avenue interchanges. Traffic volumes on this facility range from about 1,100 vehicles on the south near Dewey Boulevard to 13,000 vehicles on the north near Mercury Street. Travel on this arterial should be protected by the installation of uniform stop signs on all minor intersecting streets from Rowe Road to Park Street. The four-way stop at Second Street should be eliminated either by the installation of a traffic actuated signal or removing the stop signs on Main Street. Traffic on Main Street should definitely be given preferential treatment at this intersection as it is about three times larger than the traffic volume now using Second Street.

FRONT STREET

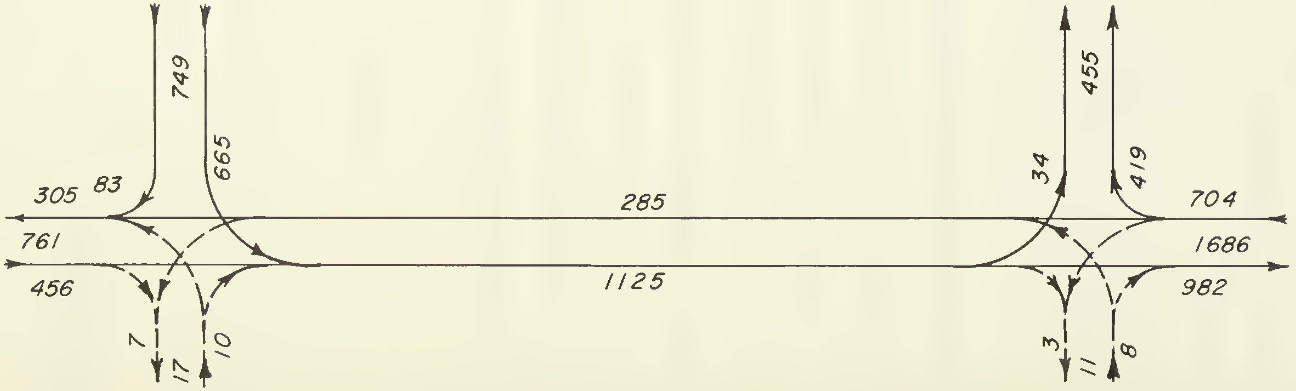
This important east-west arterial is presently operating above practical traffic capacity on the section between Harrison Avenue and Arizona Avenue. The expected increase in traffic on Harrison Avenue after the completion of the Interstate System will also tend to increase the capacity problems on Front Street.

EXHIBIT 32



BUTTE TRAFFIC ENGINEERING STUDY

Lane Arrangement On Front Street With One-Way Operation Of Utah & Arizona Avenues



Distribution of April 1965 Peak Hour Traffic With One-Way Couplets on Utah and Arizona Ave.

In order to increase the capacity of Front Street sufficiently to handle future traffic volumes, it is recommended that parking be prohibited on one side of the 60-foot section between Harrison Avenue and Main Street and on both sides of the 50-foot section between Main and Montana Streets. Four lanes of traffic then can be established throughout the entire length with the exception of the one block section between Arizona and Utah Avenues. This section should operate more smoothly with three lanes of traffic after Utah and Arizona Avenues are designated as a one-way couplet. Exhibit 32 on page 50 illustrates the proposed improvements on Front Street.

COBBAN STREET

It is anticipated that traffic on this arterial could increase in direct proportion to the future volumes and the resulting congestion on Harrison Avenue. If Harrison Avenue becomes congested, Cobban Street in conjunction with Kaw Avenue and Main Street can provide a convenient alternate route from the southeast residential area to downtown Butte. A through, fast route in this location should relieve Harrison Avenue and Utah and Arizona Avenues of a substantial part of the present commuter traffic.

Recommended improvements on Cobban Street should include its designation as a through arterial between Continental Drive and Kaw Avenue. Traffic volumes on Cobban Street should be given preferential treatment at all intersections with the exception of Harrison and Kaw Avenues.

There appears to be no justification for the four-way stops at Oregon, Lowell and Massachusetts Avenues. Stop signs on Cobban Street at these locations should be removed in the interest of moving traffic. The four-way stop at Texas Avenue should be replaced by a traffic signal interconnected with the existing signal on Harrison Avenue. This arrangement will provide the required safety at the intersection and yet allow a free flow of traffic which is essential to the maximum usage of Cobban Street.

SECOND STREET

This street has been operating as an east-west arterial between Montana Street and Shields Avenue. Traffic volumes range from 1,500 vehicles per day near Montana Street to 4,700 vehicles per day on the east near Shields Avenue. The smooth flow of traffic on this arterial is severely limited by the four-way stops now required at the intersections of Maryland Avenue, Emma Street and Arizona Avenue.

In order to improve the flow of east-west traffic it is recommended that the stop signs be removed on Second Street at the intersections of Maryland Avenue and Emma Street. Traffic at the intersection of Second Street and Arizona Avenue should be analyzed for the possible installation of a signal after Arizona Avenue is placed in one-way operation. Four-way stop signs at Second and Main Streets are now controlling traffic at this intersection. Traffic volumes warrant the installation of a traffic actuated signal at this location and it is, therefore, recommended that a signal be installed as quickly as possible. Traffic volumes at the intersection of Second and Montana Streets do not meet the minimum warrants for signal installation. The stop signs on Second Street should,therefore, be continued at the Montana Street intersection.

GRAND AVENUE

This east-west arterial between Harrison Avenue and Continental Drive is now carrying traffic volumes ranging from 340 vehicles per day on the east to nearly 6,000 vehicles per day on the west near Harrison Avenue. It is anticipated that these volumes will increase sufficiently to warrant four lanes in the future. It is recommended that this major arterial be reconstructed to a four-lane standard from Harrison Avenue to Continental Drive. Traffic using Grand Avenue should be given preference at all intersections except Harrison Avenue, Garfield Avenue, and Continental Drive. Traffic volumes at the intersection of Grand and Texas Avenues, that are now controlled by four-way stop signs, warrant the installation of a traffic actuated signal. This signal should probably be installed in connection with the proposed reconstruction. Channelization and signals should also be installed on Grand Avenue at the intersection with Harrison Avenue as shown in Exhibit 33 on page 54.

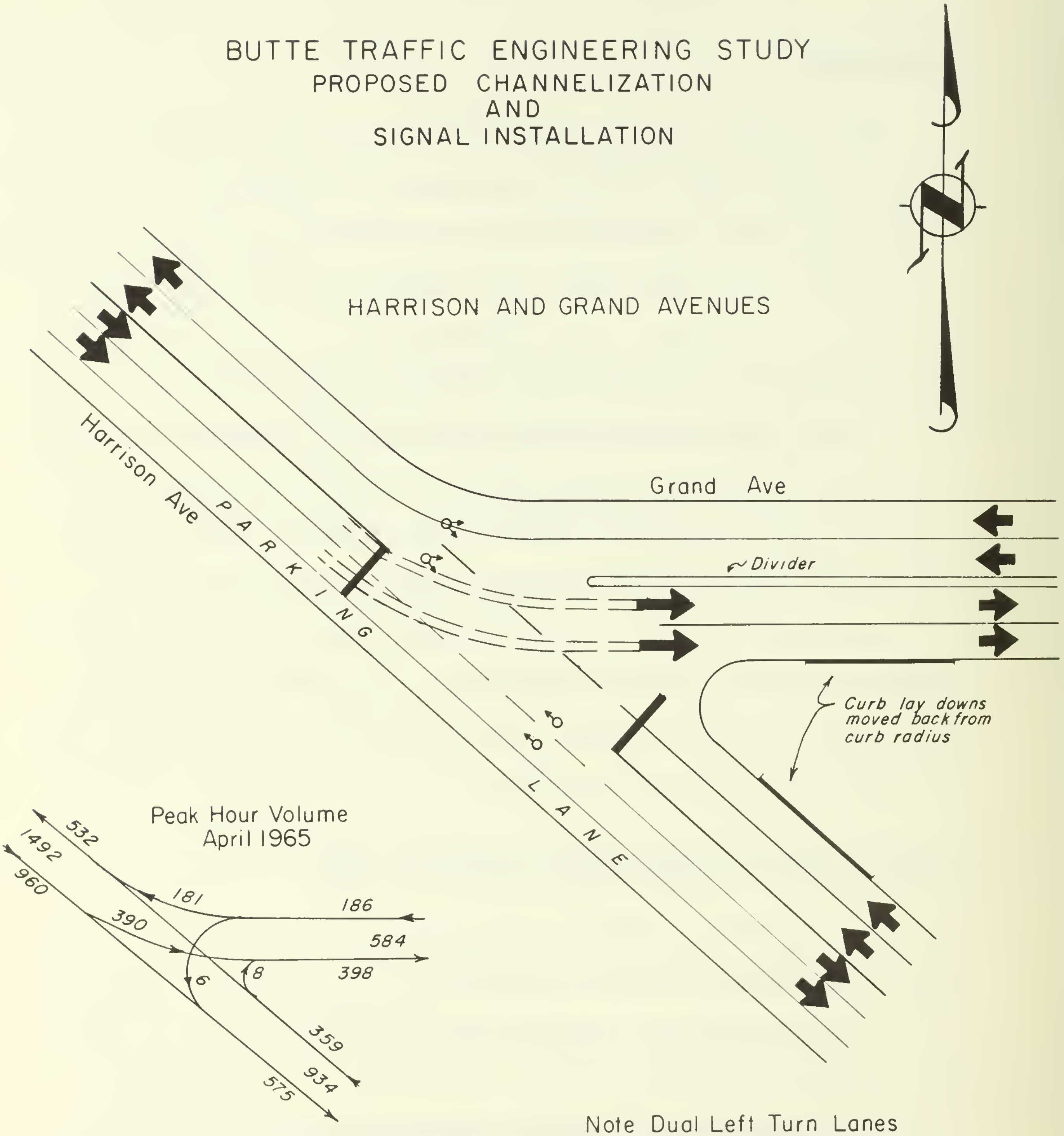
CONTINENTAL DRIVE, FARRELL STREET AND SHIELDS AVENUE

These three streets combine to form a major north-south arterial connecting the rapidly developing residential areas to the southeast with the central business district. Traffic volumes now range from 600 to almost 7,000 vehicles per day.

Preferential treatment should be accorded traffic using this arterial at all intersections with the exception of Talbot Avenue (US 91). Regulation stop signs should be placed at all intersecting streets. Some of these streets do not have any stop signs in place at the present time while

BUTTE TRAFFIC ENGINEERING STUDY
PROPOSED CHANNELIZATION
AND
SIGNAL INSTALLATION

HARRISON AND GRAND AVENUES



Note Dual Left Turn Lanes

EXHIBIT 33

others have nonregulation signs set at various heights.

The four-way stop at Shields Avenue and Gallatin Street was evidently installed to protect a school crossing. It is recommended that this four-way stop be replaced by a standard school crossing complete with proper signing as shown in Exhibits 34 and 35 on pages 56 and 57.

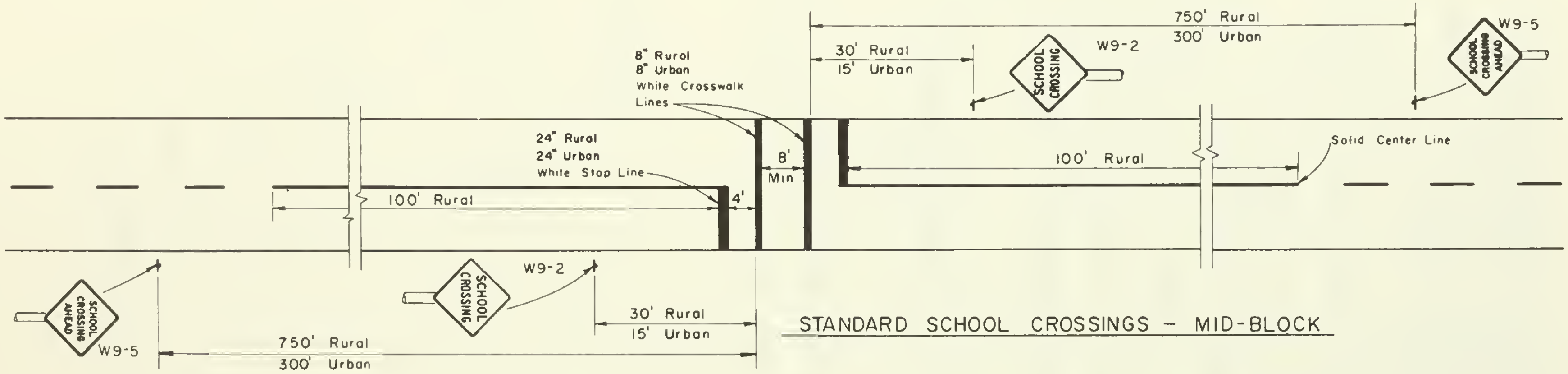
A special speed study was made on this arterial to determine the proper speed zoning. Speeds were taken by radar at 11 locations on Shields Avenue, Farrell Street and Continental Drive. Recommendations for speed zoning, based on the results of this traffic engineering study, are shown in Exhibit 36 on page 58.

It is further recommended that the following signing be changed on Continental Drive.

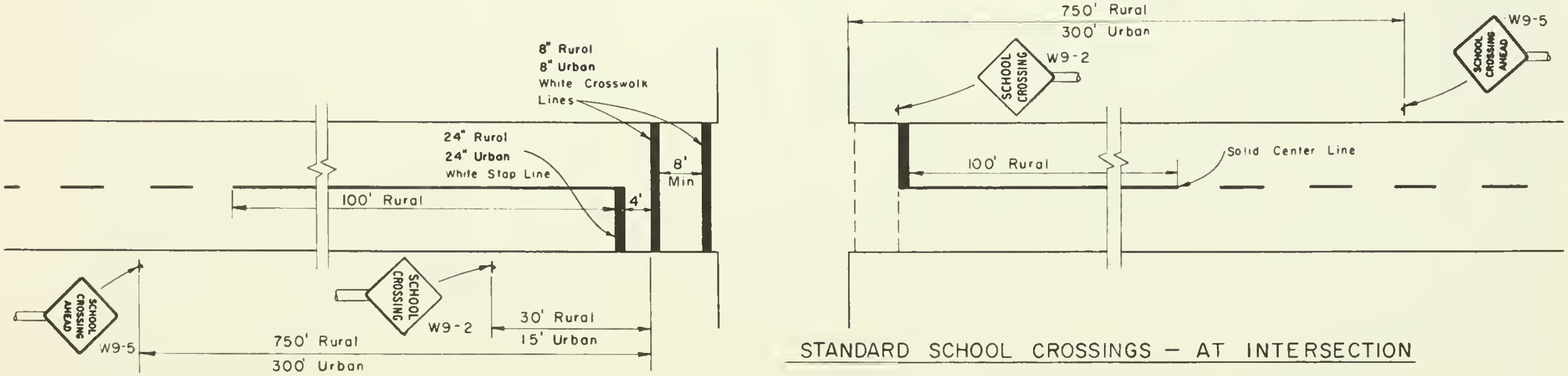
1. Remove the "Slow Sign" near Amherst Street at station 310 + 00.
2. Remove the "School - 15 MPH" sign near Burlington Street at station 265 + 00.
3. Remove the "School Zone' and "Children Crossing Stop Signs" near Quincy Street at stations 273 + 00 and 279 + 00.
4. Install a "School Crossing" with standard signing at Quincy Street in the vicinity of station 275 + 00, as shown in Exhibits 34 and 35 on pages 56 and 57.

The possibility of an interchange between I 90 and Continental Drive about 0.9 mile south of Lofter Lane has been under consideration for some time. Due to the fact that Continental Drive parallels Interstate 90 within a distance of about 200 feet, an interchange at this location is considered feasible from a construction standpoint.

SCHOOL CROSSING (UNPATROLLED)



STANDARD SCHOOL CROSSINGS – MID-BLOCK

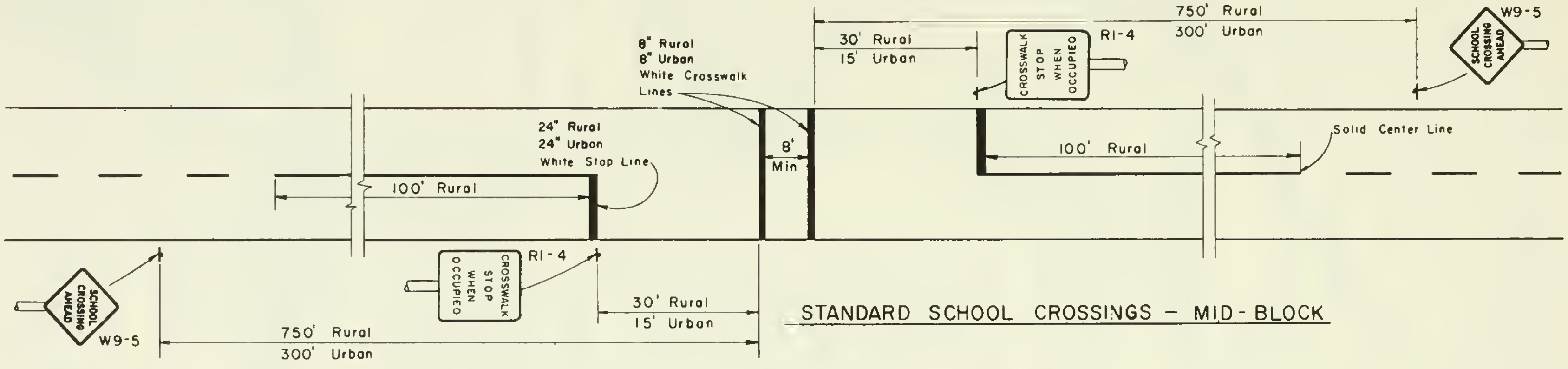


STANDARD SCHOOL CROSSINGS – AT INTERSECTION

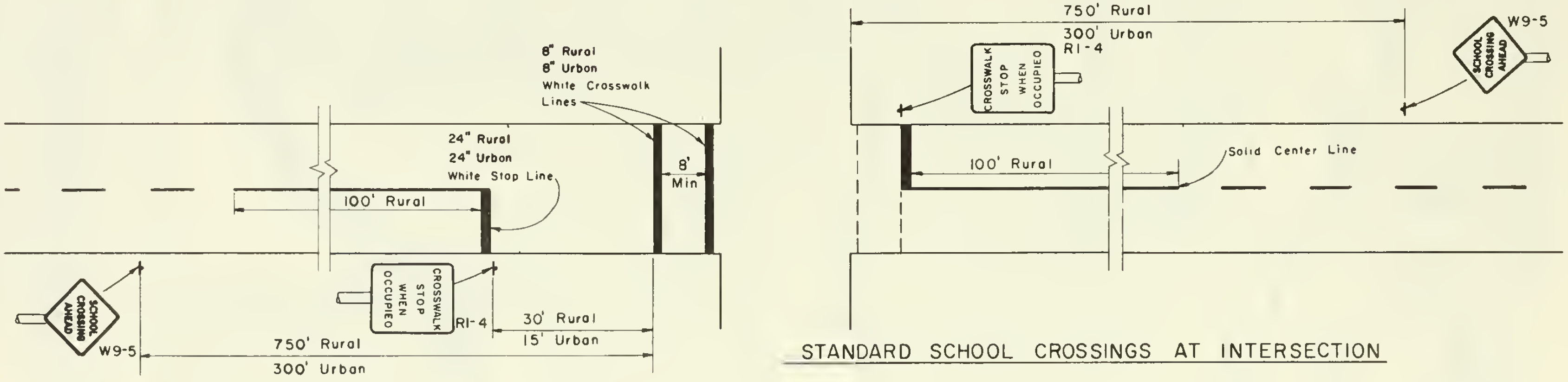
EXHIBIT 34

SCHOOL CROSSING (PATROLLED)

When School Crossing is Patrolled by a School Patrol, Police, or Adult Crossing Guards.

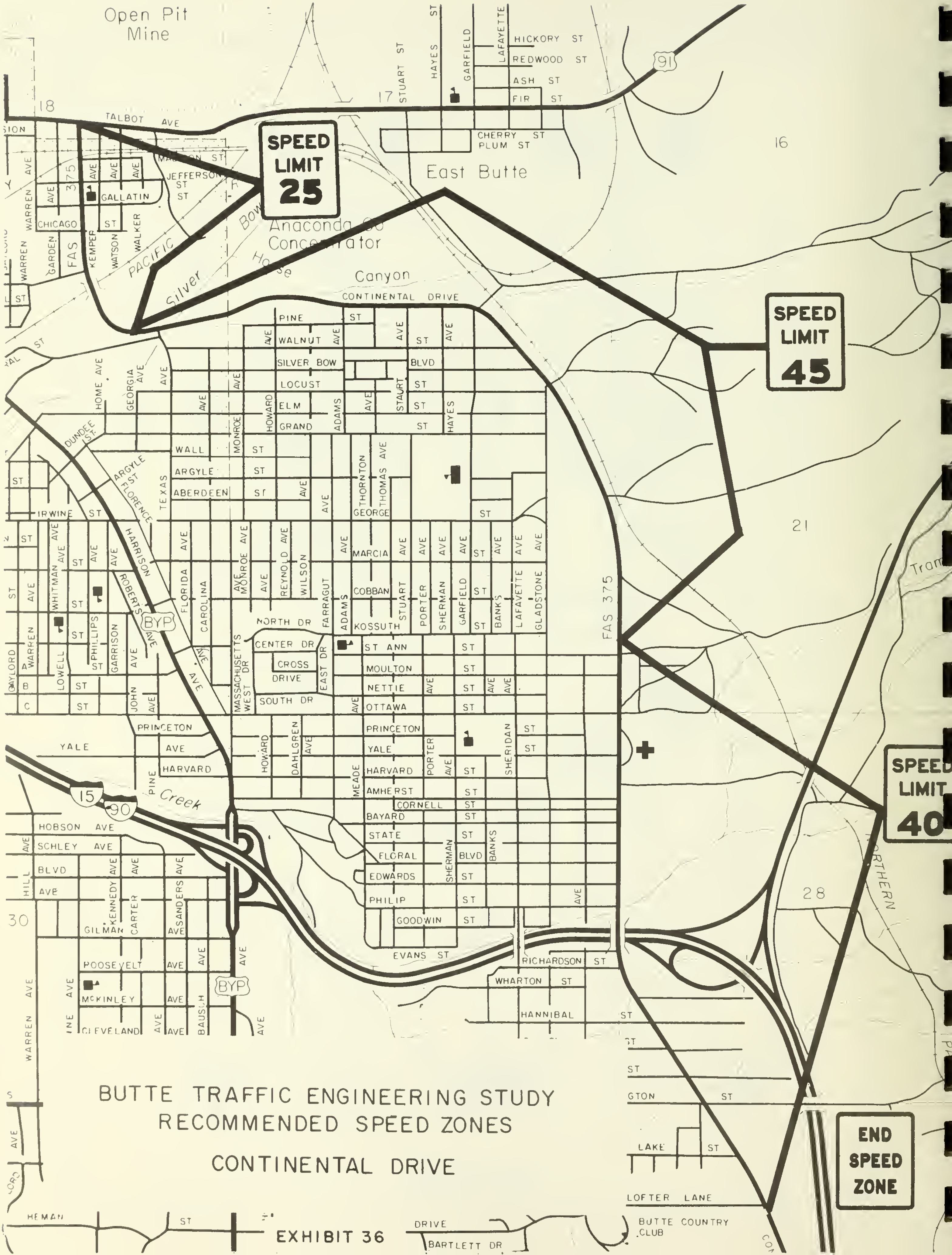


STANDARD SCHOOL CROSSINGS – MID-BLOCK



STANDARD SCHOOL CROSSINGS AT INTERSECTION

EXHIBIT 35



BUTTE TRAFFIC ENGINEERING STUDY
RECOMMENDED SPEED ZONES

CONTINENTAL DRIVE

EXHIBIT 36

Traffic studies have indicated that this interchange can be justified by future traffic volumes having origins and destinations in the subdivision under construction to the west of this location.

It is, therefore, recommended that the Continental Drive interchange with I 90 be constructed at this location.

GARFIELD, STUART, AND SHERIDAN AVENUES AND ATHERTON LANE

These streets have been acting as north-south arterials from the Country Club Addition on the south to US 91 in the vicinity of East Butte on the north. They provide a convenient bypass for through traffic as well as serving traffic having origins or destinations within the residential area that they traverse. Traffic volumes on these streets range from about 650 vehicles on the south to 2,700 on the north.

It is recommended that traffic using these streets be protected by the installation of regulation stop signs on all intersecting streets with the exception of Amherst, Cobban, Continental Drive, Columbia Gardens Road and US 91 as shown in Exhibit 27 on page 39. The stopping of northbound vehicles at the Columbia Gardens Road is indicated due to the lay-out of the existing intersection. A small amount of reconstruction as shown in Exhibit 37 on page 60 would make this intersection safe for through north-south traffic. Guide signing at the intersections of US 91 and Stuart Avenue and Continental Drive and Garfield Avenue would help motorists find their way through this area.

North-south traffic is now using Garfield Avenue between Kossuth Street and Continental Drive. This requires a two block jog to the west from Sheridan Avenue. Garfield Avenue is also located adjacent to a school

BUTTE TRAFFIC ENGINEERING STUDY
PROPOSED CHANNELIZATION
OF
COLUMBIA GARDENS RD – STUART AVE.

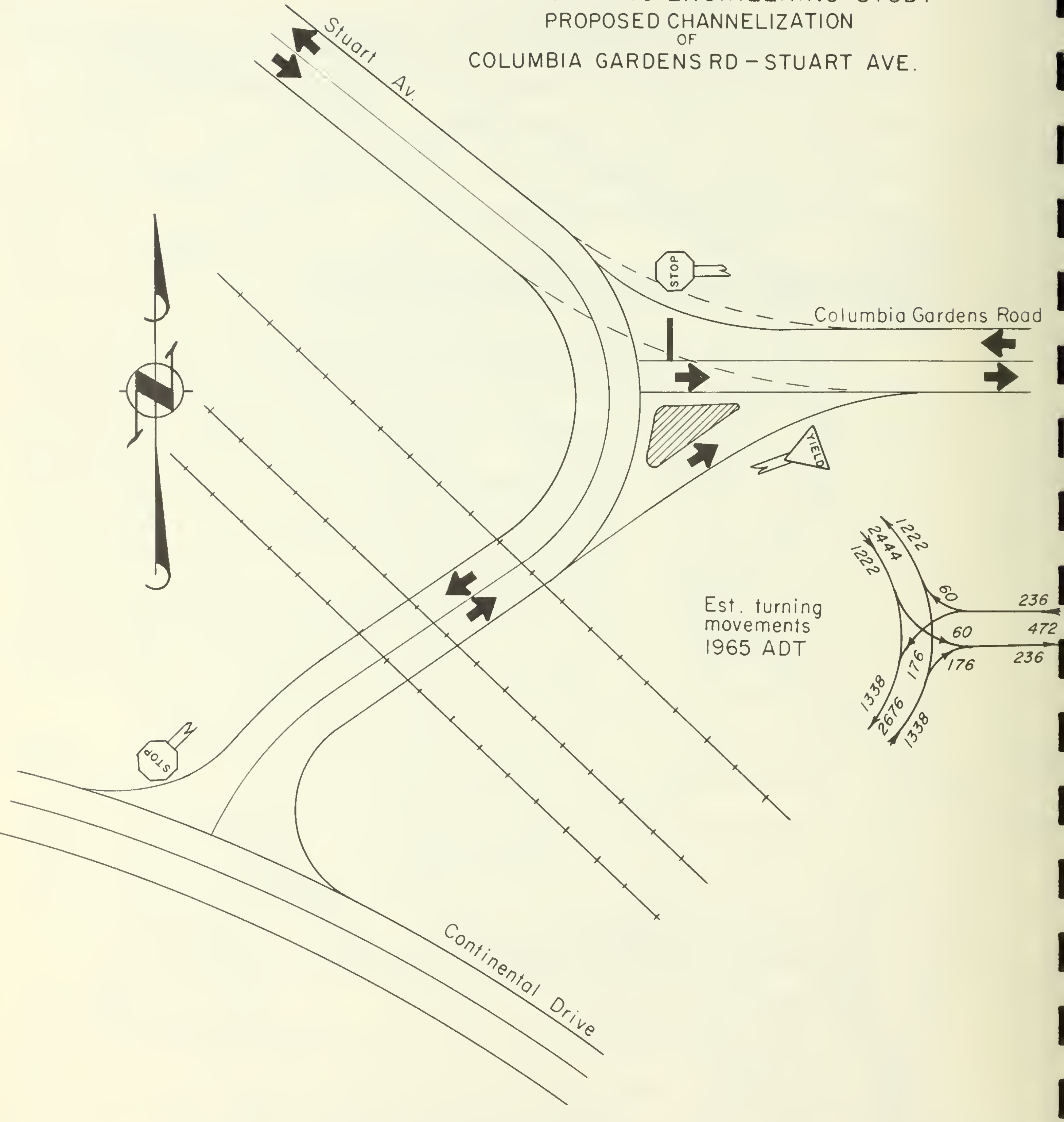


EXHIBIT 37

which is not an ideal situation for an arterial street location. In order to correct these situations it is recommended that Lafayette Avenue be improved from Kossuth Street to Continental Drive. It then should be designated as an arterial to replace Garfield Avenue. This improvement will eliminate the jog and move the through traffic 2 blocks to the east of the school.

AMHERST STREET

East-west traffic in the residential area between Continental Drive and Harrison Avenue is now split between Floral Boulevard and Amherst Street. Our studies indicate that Amherst Street should be designated as the principal arterial in this area as shown in Exhibit 27 on page 39. Regulation stop signs should be erected on all intersecting streets with the exception of Continental Drive and Harrison Avenue. A traffic actuated signal is warranted and recommended at the intersection of Harrison Avenue. Traffic at the intersection of Amherst Street and Farragut Avenue is now controlled by four-way stop signs. Traffic volumes at this intersection do not warrant signalization at the present time and it is, therefore, recommended that the four-way stop be continued. It is possible that traffic volumes now using Floral Boulevard will move to Amherst Street after it is designated as an arterial and a signal installed at Harrison Avenue. In this case the traffic volumes at the intersection of Farragut Avenue and Amherst Street may increase sufficiently to justify a traffic actuated signal.

FARRAGUT AND ADAMS AVENUES

It is recommended that these avenues be designated as arterials from Amherst Street to Continental Drive. Traffic volumes range from 4,500 vehicles on the south to 450 vehicles on the north. Traffic using these avenues should be given preferential treatment at all intersections with the exception of Amherst, Cobban and Grand Streets and Continental Drive.

Traffic at the intersection of Farragut Avenue and Cobban Street does not now meet the minimum signal warrants. It is, therefore, recommended that the stop signs be removed on Cobban Street and retained on Farragut Avenue. This intersection should be investigated again, after traffic patterns have stabilized, to determine whether the warrants for a traffic actuated signal can be met.

OREGON AVENUE

This avenue is one of two facilities crossing the Interstate System by means of a grade separation between the Harrison Avenue and Montana Street interchanges. Traffic volumes on this avenue range from about 600 vehicles per day on the south to 1,600 vehicles per day on the north near Harrison Avenue.

It is recommended that traffic using this facility should be given preferential treatment at all intersections with the exception of Dewey Boulevard, Cobban Street and Harrison Avenue.

DEWEY BOULEVARD

Due to its location south of the Interstate System this east-west arterial has become important in recent years in the movement of traffic between Rowe Road and Harrison Avenue. Traffic volumes now range from 900 vehicles per day on the west to 2,600 on the east.

Dewey Boulevard should be designated as a through arterial from Rowe Road to Harrison Avenue. Traffic volumes on this arterial should be given preference at all intersections with the exception of Rowe Road, Lexington Street and Harrison Avenue. There appears to be little or no justification for the stop signs on Dewey Boulevard at Hill Avenue. If they were installed to provide a crossing for school children it is recommended that the stop signs be removed and a standard school crossing with proper signing be installed.

Traffic volumes at the intersection of Dewey Boulevard with Harrison Avenue meet the minimum warrants for a traffic actuated signal. It is, therefore, recommended that a signal be installed at this intersection.

PLATINUM STREET

It is recommended that this street be designated as an arterial from Excelsior Avenue to Arizona Avenue. East-west traffic volumes on this facility range from 2,400 to 3,000 vehicles per day.

Traffic signals are warranted and in place at the intersections of Montana and Main Streets. Signals are also warranted and recommended at the intersections of Utah and Arizona Avenues. Channelization is also recommended at the intersections of Utah and Arizona Avenues as shown in Exhibit 31 on page 46. Standard stop signs should be installed on all other intersecting side streets.

PARK AND OHIO STREETS

The "T" three-way intersection formed by these two streets was studied specifically at the request of City Officials. Traffic is controlled at the present time by a stop sign on Ohio Street. The intersection appears to be operating quite well under existing conditions. Traffic volume counts indicate there is no justification for a traffic signal.

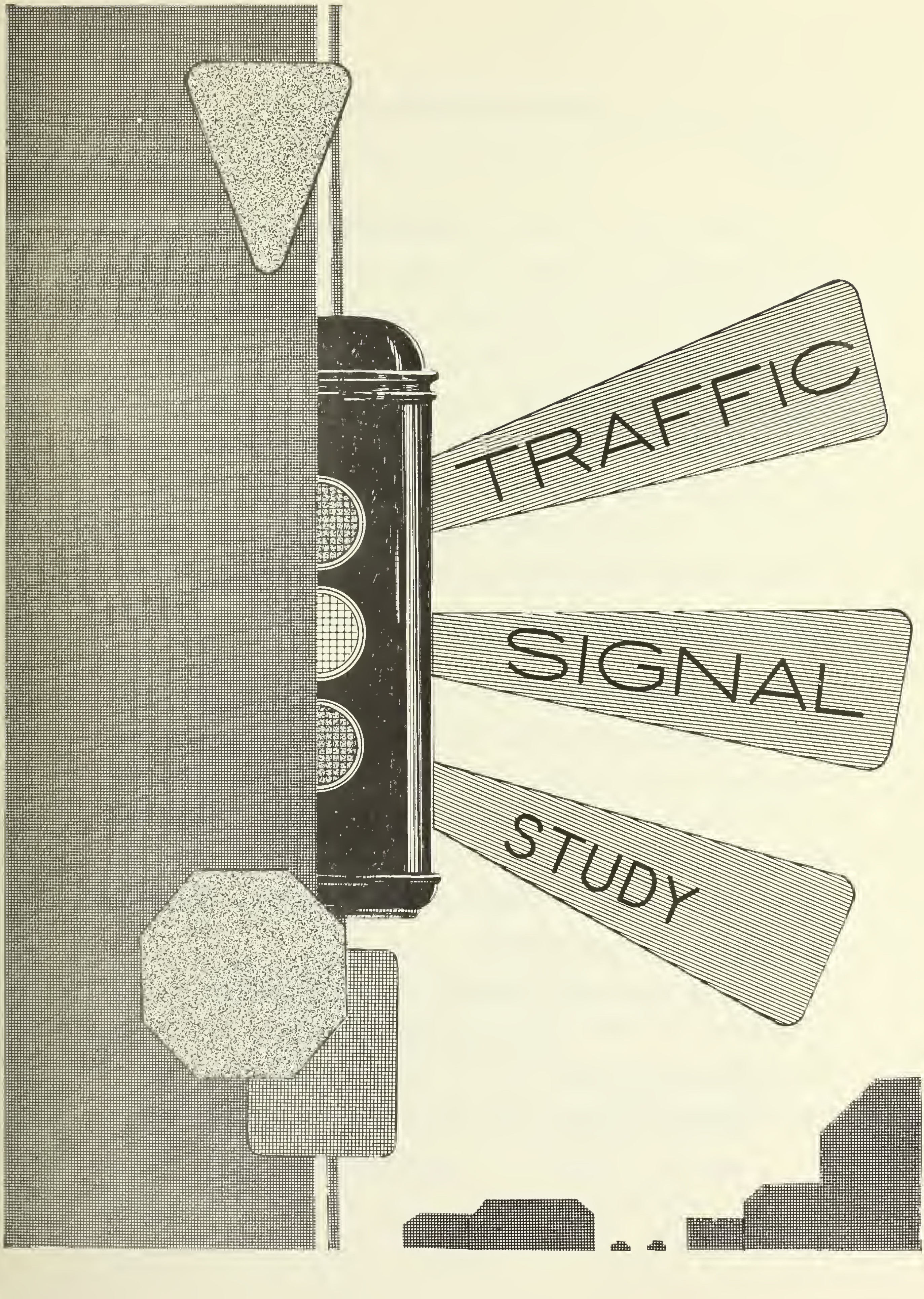
Access to the service station located in the southwest quadrant of the intersection should be limited by reducing the present curb cuts to within 10 feet of the curb radius. Reduction of the widths of the present curb cuts will increase sight distance to the west and will control undesirable traffic movements through the intersection.

MERCURY STREET

Mercury Street has been operating successfully as a truck bypass and major arterial between Montana and Gaylord Streets. Traffic volumes range from 4,400 on the east to 7,700 vehicles per day in the Central Business District. Signals are in place at the intersections of Montana and Main Street and Arizona Avenue. A four-way stop of all traffic at Ohio Street is controlled by a red flasher.

The Mercury and Ohio Street intersection has been investigated to determine the feasibility of signalization or removing the stops on Mercury Street. Traffic volumes are far below minimum requirements for any type of traffic signal and it is considered advisable to continue the stopping of traffic on Mercury Street due to the limited sight distance.

Signs and signals in place on this facility were found to be generally substandard and should be replaced. Standard guide signs directing traffic to this bypass of the central business district should be installed at the east and west ends.


TRAFFIC
SIGNAL
STUDY

BUTTE TRAFFIC SIGNAL STUDY

PURPOSE

The Butte traffic signals have been studied to determine compliance with requirements of the Manual on Uniform Traffic Control Devices, street capacity under existing and proposed conditions, and to make recommendations for the safe and efficient movement of present and future traffic.

The following comments and recommendations are a brief summary of a complete signal study that is on file in the Traffic Engineer's office. It was not considered essential that a detailed technical study of the entire signal system be included in this report. The detailed information on each intersection is available to City and County officials.

DESCRIPTION OF EXISTING TRAFFIC SIGNALS

Traffic signals in Butte have a single indication for each approach, serving both vehicles and pedestrians, and are suspended over the center of the intersection by a single span wire. Traffic signal controllers are fixed time and operate on a 50 second total cycle length. The signals on Park Street and on Main Street are interconnected for progressive movement of traffic, as are the signals at the intersection of Olympia and Dundee Streets on Harrison Avenue.

Generally the signals do not conform to the standards as set forth in the Manual on Uniform Traffic Control Devices. They are deficient in the number of signal faces visible to traffic on each approach and in the lack of pedestrian signals at each end of the crosswalks. The lack of standard signal installations is most noticeable on the multilane facilities and may be a prime contributor to accidents.

INTERSECTIONS NOT WARRANTING SIGNALS

The existence of any traffic signal must be based upon specific traffic warrants. The Manual on Uniform Traffic Control Devices lists six warrants, or combination of warrants, that may be used as the basis for the installation of traffic signals. The existence of any signal not meeting these warrants has been found to cause excessive delay, disobedience to signal indications, use of less adequate alternate routes to avoid signals, and often increases accident frequency.

The existing traffic signals at the intersections listed below do not meet the traffic volume warrants and it is, therefore, recommended that they be removed:

Park and Excelsior
Park and Washington
Park and Idaho
Harrison and Olympia
Harrison and Dundee
Harrison and Marcia
Excelsior and Caledonia

INTERSECTIONS WARRANTING ADDITIONAL SIGNALS

Intersections not signalized and having traffic volumes sufficient to meet the minimum requirements of traffic signal warrants in the Manual on Uniform Traffic Control Devices are:

Main and Galena
Main and Second
Utah, Arizona and Platinum
Harrison and Grand
Harrison and Amherst
Harrison and Dewey

PAVEMENT MARKINGS AND OVERHEAD LANE SIGNS

Lane-use control markings and word and symbol markings that supplement overhead lane signs are recommended at all intersections where proper lane-use will expedite the flow of traffic. Two prime examples of the use of such pavement markings and signs would be the intersections of:

Montana and Front -- left turn only lane on the north approach.

Utah and Front -- two-lane left turn on the north approach.

TRAFFIC SIGNAL TIMING

The yellow intervals used in Butte signal timing are 1.5, 2.0, and 2.5 seconds, except that signals on Park Street have a 4-second interval and the signal at Utah and Front has a 3-second interval. The Manual on Uniform Traffic Control Devices recommends that the minimum yellow interval be 3 seconds. The Traffic Engineer's Handbook recommends a 3.5 second yellow clearance interval for streets 60 feet wide with parking on both sides.

A comparison of street capacity, as determined by existing signal timing with April 1965 peak-hour volumes, indicates that intersection utilization of capacity can be improved by changing timing splits at the following intersections:

Location	Percent of Green Time	Location	Percent of Green Time
Broadway	40	Montana	60
Broadway	40	Wyoming	60
Broadway	35	Arizona	65

Location	Percent of Green Time	Location	Percent of Green Time
Park	35	Montana	65
Park	40	Arizona	60
Front	40	Montana	60
Front	45	Utah	55
Montana	60	Mercury	40
Main	55	Mercury	45
Main	55	Platinum	45
Arizona	55	Mercury	45
Harrison	65	George	35
Harrison	65	Marcia	35
Harrison	65	Cobban	35

The 40 second total cycle length at Second and Utah should be changed to 50 seconds.

FUTURE SIGNAL RECOMMENDATIONS

GENERAL

The modernization of traffic signals in the City of Butte, to meet requirements of the Manual on Uniform Traffic Control Devices, will require completely new signal installations throughout the city. Double far side indication is obtained through the use of a signal pole on each corner with the signals either span-wire mounted or mounted at the side of the signal pole on a mast arm. Walk-Don't Walk pedestrian signals would be most desirable. Leading or lagging intervals will facilitate the movement of heavy left turns.

The following factors were taken into consideration in recommending the signal system that would best fill the needs of the City of Butte; traffic volumes, directional characteristics of traffic, flow turning movements, street widths, capacities, pedestrians, parking area classification, and future growth.

TRAFFIC ADJUSTED SIGNAL CONTROLS

For the downtown area centered around Park, Broadway and Main Streets, an interconnected traffic adjusted system of control known as a PR system is recommended. Sampling detectors on Park Street would transmit information concerning volume and direction of traffic to a PR master controller which would direct the local controller at the intersection to regulate the traffic signals accordingly. Six different cycle lengths, three cycle splits, and four offsets are possible. Intersections at which PR controllers should be located are:

Park and Montana

Park and Dakota

Park between
Dakota and Main

Park and Main

Park and Wyoming

Park and Arizona

Main and Granite

Main and Mercury

Main and Platinum

Broadway and Montana

Broadway and Main

Broadway and Mercury

Broadway and Arizona

Montana and Granite

Montana and Mercury

Wyoming and Granite

Estimated cost of the downtown PR system is $136,000.00

TRAFFIC ACTUATED SIGNALS

Outside of the interconnected downtown area, traffic actuated signal installations will provide the most flexible and efficient type of traffic control.

Intersections at which traffic actuated signals should be located are:

Montana and Platinum

Montana and Iron

Montana and Front

Utah, Arizona and Platinum

Utah and Second

Utah and Front

Harrison and Grand

Harrison and George

Harrison and Cobban

Harrison and Amherst

Front and Main

Main and Second

Estimated cost of traffic actuated signals is $130,000.00.

SUMMARY

The total cost of completely new and modern signals in the Butte urban area is estimated to be $266,000.00